RAILROAD GAZETTE

FRIDAY, DECEMBER 10.

The Cost of Locomotive Power on Railroads of Different Countries.

[From a forthcoming book entitled "Railway Problems," by J. S. Jeans, Secretary of the British Iron and Steel Association.]

There is probably no subject connected with railway working that has been so fiercely contested, and with regard to which there have been so many important changes and developments, as that of locomotive power. In this department of railway expenditure, there is equally scope for great waste and great economy. In general, it is perhaps not too much to say that the profits or losses of a railway may be traced to the efficiency or otherwise with which the locomotive arrangements are controlled. The form of the engines employed, their weight, their durability, the tonnage that they are made to carry over a given period, the cost of repairs, the fuel expenditure, and many other considerations that are of the first importance in relation to economical working, are primarily within the cognizance and command of the locomotive superintendent, so that it is essential in any analysis of railway economy to bestow attention on this aspect of our subject.

That there is a very great diversity of practice and results in reference to locomotive working is sufficiently proved by the fact that the cost of locomotive power varied in 1884 from a maximum of 10.75d. per train mile on the Northeastern to a minimum of 7.13d. on the Manchester, Sheffield & Lincolnshire; that the cost of repairs per engine varied from 4.32d. per train mile on the Northeastern to 1.57d. on the Highland railways; and that the consumption of fuel per engine mile varied from a maximum of 47.48 lbs. on the Caledonian to a minimum of 28.92 lbs. per train mile on the London, Brighton & South Coast Railway.

These differences are not to be understood as applying to conditions strictly relevant and parallel to each other. On the contrary, the circumstances under which different descriptions of traffic are worked are often so dissimilar that no proper comparison is possible. If anything, we have to make a contrast rather than a comparison, in considering the light* passenger traffic of our Southern lines with the very heavy goods traffic of the Midlands and the North of England—the very lightly-laden trucks that are generally found running in agricultural districts with the full truck-loads that are invariably found in the working of mineral traffic in our manufacturing centres.

When, therefore, we state that the cost of locomotive power had increased from 8.13d. per train mile in 1869, on the railways of the United Kingdom as a whole, to 11.09d. in 1873; had fallen again to 8.13d. in 1880, and increased again to 8.35d. in 1884, these figures in themselves, unaccompanied by any explanatory comments, might very seriously misrepresent the true state of the case. The fact is, that during this interval, brief as it is, the conditions under which the traffic of our leading lines is worked had greatly changed. In the earlier days of the railway system the locomotive engines employed were very much lighter than they have since become. In 1850, engines of 25 tons weight were regarded as very heavy, and so were 35 ton engines in 1860. In 1870, comparatively few engines were 40 tons in weight. Now, however, many engines are running on the Continent, and some in this country, that weigh 45 to 50 tons, exclusive of the tender, and locomotives have been constructed that weigh as much as 60 tons.

Again, it is not to be assumed that the locomotive engines that give the greatest mileage over a given period are necessarily the most economical. It may very well happen, indeed, that the contrary is the case. The higher the speed at which a locomotive is worked, the greater the expenditure all round. Increased speed entails greater wear and tear, both in locomotives and in permanent way, and a larger consumption of fuel; and it is a moot point with railway authorities how far these extras are compensated for by the additional work got out of the rolling stock. The locomotive cost of working the railway traffic of the United Kingdom in 1884 was over 26 per cent. of the total cost per open mile, amounting to £503 on a total working cost of £1,904. Anything that tends to increase this serious item of working expenditure ought, therefore, to be very critically examined in all its bearings. The element of speed is most important. It is a cardinal article of a locomotive engineer's creed and practice that the resistance of the atmosphere to the passage of a train is proportionate to the square of the velocity of a train.†

It might naturally be expected that some light would be shed upon the comparative cost of working locomotives at high and low rates of speed, by an analysis of the locomotive expenses of railways having different descriptions of traffic—that is to say, we might expect to find that on lines that chiefly carry passengers the locomotive expenditure would be relatively high, and that on the great mineral-carrying lines it would be relatively low. This, again, however, will be found a very unreliable test to apply, unless we can obtain access, not only to the average rate of speed for all trains, but to the average weight of the train, the age and weight of the locomotives, the character of the permanent way, and other determining considerations.

*That is light compared to a heavy freight traffic. The passenger traffic of the Southern English lines is very large.—EDITOR.

† It has been found in the case of ocean-going steamers that an increase of speed from 11 to 12¼ knots per hour involved an additional expenditure of 47¼ per cent. for fuel.

The expenditure per train mile in respect of locomotive power was, in 1884, as under for the principal mineral-carrying lines in this country:

Railways.	d.
Great Northern	7.62
Lancashire & Yorkshire	8.19
London & Northwestern	7.86
Manchester, Sheffield & Lincolnshire	7.13
Midland	7.67
Northeastern	10.75

—while for the principal passenger-carrying lines, the corresponding expenditure in the same year was as under:

Railways.	d.
Southeastern	8.61
Great Eastern	8.56
London, Brighton & South Coast	8.97
London & Southwestern	9.68
Great Southern & Western of Ireland	9.09

But these figures do not, after all, go a long way in clearing up the question, seeing that the passenger-carrying lines have generally to pay a much higher price for their fuel,* in consequence of being remote from the coal-fields; while the Northeastern Railway, which has probably the command of the cheapest fuel in the United Kingdom, and is at the same time the greatest mineral-carrying line, has the highest locomotive train-mile expenditure of the whole.

It has been contended in several quarters that the cost of motive power on English lines is much higher than it ought to be, considering the comparative cheapness of fuel and labor. Mr. Dorsey has calculated that in England the expenditure on this account is almost double what it is on American lines when the latter is reduced to English prices. The details of his comparison of 14 leading English and 10 leading American lines are summarized in the following table, in percentages of the total operating or working expenses:

Items.	English lines Per cent.	American lines. Per cent.	American percentages after reducing the cost of fuel and labor to English rates. Per cent.
Fuel	7.2	9.6	4.6
Wages	8 6	7.1	3.6
Repairs and renewals of locomotives	7.8	6.1	4 6
Totals	23.6	22.8	12.8

Mr. Dorsey has found that this rather remarkable result is not an accidental feature of a single year's working, but one that is confirmed by an analysis of the annual cost of motive-power on the principal railways of both countries over a series of years. He does not, however, seek to explain the reasons for the difference which he finds to exist in favor of American working. It is to be regretted that this has not been attempted, since the matter is one of vital importance, in the interests alike of railway shareholders and of the general public.

In considering the cost of any specific commodity or product, regard should be had to a given standard of comparison. In attempting to frame an estimate of the comparative expenditure incurred in locomotive power, that standard is manifestly the amount of service rendered, or work done. In Mr. Dorsey's comparison of English and American railroads, this standard does not appear to have been kept adequately in view. In order to place the matter on what we conceive to be a more reasonable and intelligible basis, we have applied this standard to Mr. Dorsey's figures, and the result hardly appears to bear out his statement of results.

The first test to which we propose to submit the figures is that of the cost of locomotive power per train mile run. This is not necessarily an infallible test, as every engineer must be fully aware. The service rendered by a locomotive cannot be adequately measured by any such standard, since there are no criteria whereby to estimate the useful effect of the mileage so dealt with, and the locomotive may be simply shunting a wagon, or a couple of wagons in one case, and in another it may be hauling a load of 1,000 tons at the rate of 20 miles an hour. In both cases, the work done is expressed in the same terms of mileage run. In the United States, as we show elsewhere, the average work performed by a locomotive per train-mile run, as tested † by the average earnings per train-mile, is considerably higher than in the United Kingdom, and this fact is entitled to the fullest consideration. Subject, then, to these qualifications, we find that the average expenditure for locomotive power per train-mile on the ten railways selected by Mr. Dorsey at not less than 12d.; and if we cast out the Baltimore & Ohio Railway, which appears to show the remarkably low average of 5d. per train mile, the average comes out as 14d. per train mile. Against this we have an average of only 8.7d. per train mile for the ten principal railways in the United Kingdom—again the same railways, by-the-bye, that Mr. Dorsey selected, but reduced in number from 14 to 10, in order that the conditions of the comparison may, as far as possible, be strictly parallel with each other. The details for both sets of railways are given in the following tabular statements (I. and II.):

I. *Statement showing expenditure for Locomotive Power on ten of the principal English railways in* 1884.

Railways.	Total expense per train mile. s.	Cost of loco. power.—Per train mile. d.	Cost of loco. power.—P. c. of total working expenses.
Great Northern	2.3	7.6	27.1
Northeastern	2.8	10.8	31.7
Midland	2.4	7.7	27.1
London & Northwestern	2.7	7.9	24.0
Great Western	2.5	7.7	26.5
Great Eastern	2.6	8.6	27.8
Caledonian	2.5	8 1	26.9
North British	2.2	6.5	24.6
London & Southwestern	3.0	9.7	26.9
London, Brighton & South Coast	2.4	10.1	31.1
Average	2.7	8.7	27.0

* The cost of fuel per ton varied in 1885 from 5s. 10d. in the case of the Lancashire & Yorkshire Railway, to 17s. 8d. in the case of the North London.

† A ridiculous test where rates vary so greatly.—EDITOR.

II. *Statement showing the expenditure for Locomotive Power on ten leading (?) American railways in* 1884.

Railways.	Cost of loco. power.—Per train mile. d.	Cost of loco. power.—P. c. of total expenses.
Boston & Albany	18	31.3
Boston & Lowell	17	26.3
Boston & Maine	16	23.4
Boston & Providence	18	21.9
Old Colony	16	21.6
New York, New Haven & Hartford	14	18.0
New York, Lake Erie & Western	15	22.8
New York Central & Hudson River	15	23.3
Pennsylvania—Pa. Division	11	21.9
Baltimore & Ohio	5	23.1
Average	12	23.0

It will be observed that while the average locomotive expenditure per train mile is absolutely higher in the United States, it is relatively lower, being only 23 per cent. of the total working expenditure, as compared with 27 per cent. for the United Kingdom. This fact is manifestly not without importance, and it is made a good deal of in comparisons of English and American railways; but the truest test would seem to us to be that of the expenditure per train mile. Although not strictly germane to the point under consideration, attention may suitably be directed to the fact that the average working expenditure per train mile on the railways dealt with, under all heads, is 4.4s. in the United States, and 2.7s. in the United Kingdom, showing an increase of 1.7s. per train mile for American lines, or 63 per cent. In a subsequent chapter we shall show how this remarkable difference arises, so far as it is capable of elucidation by the figures at command.

There is still another method of instituting a comparison of the cost of motive power as between different countries, which we propose to apply to the case under consideration. It is that of the average annual expenditure for power per locomotive employed, including, of course, as before, the several items of fuel, repairs and renewals, and drivers' wages, etc. The next two tables (III. and IV.) have been compiled for the purpose of showing the results of this test as regards the English and American lines already specified. It will be observed that, on the ten English lines dealt with, the average annual expenditure incurred per locomotive employed has been £636, the average number of train miles run for that expenditure being 17,539. In the United States the average annual expenditure per locomotive has been £1,151, and the average number of miles run has been 23,928. To run and maintain the American locomotive has, therefore, cost £515, or 80 per cent., more over the year than has been spent on its English congener, against which there is to be placed the fact that the American locomotive has done an average of 6,389, or 37 per cent. more miles than the English one. This does not appear to justify the assumption that American motive power is less costly than English, but seems, on the contrary, to point to quite a different conclusion. It is desirable that we should not overlook the fact that both averages are made up of great and entirely inexplicable extremes. On the English lines, the Southwestern shows a maximum of £900, and the Northwestern a minimum of £505, per locomotive. On the American lines, the *maxima* and *minima* are still more remarkable—the New York, New Haven & Hartford having an average as high as £1,774, and the Baltimore & Ohio one as low as £557, per locomotive. In the latter case, therefore, we find one line with just about three times the average annual expenditure of another, with which we should be justified in expecting it closely to correspond. There are equally unaccountable differences in the annual mileage got out of the locomotives on different lines. The details of the comparisons are presented herewith:

Statements showing the Annual Average Expenditure per Locomotive Incurred for Locomotive Power on Ten Leading Lines in the United Kingdom and in the United States, with the Average Annual Number of Train Miles run per Engine in each case.

III.—*English Locomotives.*

	Per locomotive.—Average annual expenditure.	Per locomotive.—Average train miles run.
Great Northern	£683	21,518
Northeastern	728	16,240
Midland	626	19,600
London & Northwestern	505	15,422
Great Western	617	19,313
Great Eastern	766	21,456
Caledonian	613	18,101
North British	537	19,959
London & Southwestern	900	22,223
London, Brighton & South Coast	742	19,844
Average	£636	17,539

IV.—*American Locomotives.*

	Per locomotive.—Average annual expenditure.	Per locomotive.—Average No. of train miles.
Boston & Albany	£1489	20,000
Boston & Lowell	1771	25,000
Boston & Maine	1307	21,000
Boston & Providence	1408	18,000
Old Colony	1325	20,000
New York, New Haven & Hartford	1774	31,000
New York, Lake Erie & Western	877	14,000
New York Central & Hudson River	1588	25,000
Pennsylvania—Pa. Division	1211	26,000
Baltimore & Ohio	557	27,000
Average	£1151	23,928

There is still another point that requires to be put in the foreground in any attempt to compare the cost of locomotive power in different countries and on different railways. It is a well-known fact that passenger traffic costs less, both in fuel and in engine repairs, than heavy goods, and especially coal, traffic. It seldom happens that exact *data* as to the differences arising in this respect are at command, but the

following comparison, which we have collated from a good authority,* will show approximately how the two descriptions of traffic compare as regards the cost of fuel:

	Consumption of fuel per engine mile in	
	Passenger engines. lbs.	Goods engines. lbs.
Great Southern & Western of Ireland..	23.36	37.6
Philadelphia & Reading.....	57	87
Paris, Lyons & Mediterranean.....	35.15	66.94
Average.....	38.50	63.85

It would appear to follow from these figures that the consumption of coal by goods engines is about 25.35 lbs., or 66 per cent., higher than in the case of passenger engines. In the working of mineral traffic the consumption of fuel is greater still, the Philadelphia & Reading Railway returning their average at 121 lbs. of anthracite coal per mile,† as compared with 87 lbs. in the case of ordinary goods engines.

It is much the same with regard to the cost of repairs and renewals, although not to an equal extent. From the source already quoted, we extract the following figures showing the differences that have been found in this regard on leading lines in the United Kingdom, the United States and France:

Railways.	Cost of repairs and renewals per engine mile in Ordinary passenger engines. d.	Ordinary goods engines. d.
Great Southern & Western of Ireland..	.809	.900
Philadelphia & Reading	2.10	2.13
Paris, Lyons & Mediterranean	2.54	3.34
Average.	1.816	2.123

In this item there would seem to be, on an average of these three lines, a difference of .307d. per mile against the good engines, being equal to about 17 per cent. In the case of coal traffic, the Philadelphia & Reading Company calculate their engine repairs at 3.13d. per mile, which is about 50 per cent. more than the average of the passenger engines. Assuming this difference, more or less modified, to be of general application, it is clear that in the United Kingdom, where there is a much larger coal traffic than in any other country in the world, the expenditure for motive power might be expected to be correspondingly more.

With reference, however, to the ten typical lines of each country selected by Mr. Dorsey, and adopted by ourselves, for the purposes of a comparison of the United Kingdom and the United States, there does not seem to be any point in favor of English lines as regards the character of the traffic carried. On the contrary, the ten American lines, with a total mileage of 81,587,000, have run 51,150,000 miles, or 63 per cent. of the whole, in goods trains. The United Kingdom, on the contrary shows, with regard to the selected lines, a total train mileage of 200,291,000, of which 99,497,000 miles, or 50 per cent., were goods trains. This difference manifestly, to a certain extent, explains and justifies the higher expenditure for locomotive power, per train mile and per locomotive employed, that we have found to prevail in the United States. It may at the same time be remarked that in both cases the more important mineral-carrying lines are embraced in the comparisons, and that a comparison of the two countries as a whole would bring out a rather different result. Particulars are contained in Tables V. and VI. [Which show goods trains to have made from 18 and 27 to 59 per cent. of the total train mileage of the English lines, and from 25 to 72 per cent. on the American lines.]

Hitherto we have limited our comparison of the cost of locomotive power of the United Kingdom and the United States to a number of selected lines in both countries, selected, not by us, but by the author whose statements and conclusions we have deemed it desirable to traverse. It is, however, possible to carry the matter further than this, since there are in existence *data* concerning the general working expenses of all the railroads of the United States for the year 1880, collected for census purposes. In the absence of such statistics for a later period, we must have recourse to those for that year, but it is scarcely probable that, in the comparatively short interval that has since elapsed, the general character and scope of the facts will have altered very materially.

Taking the railroads of the United States as a whole, the expenditure occurred in 1880 under the head of locomotive power was $88,048,000 divided as follows:

Fuel	$32 836,000
Water-supply.....	2,388,000
Locomotive service.....	27,239,000
Repairs, etc.....	21,831,000
Oil and waste.....	3,754,000

And as the total train mileage for the same year was 463,341,000 miles, it follows that the average cost of locomotive power per train mile was approximately 9.1d. The average expenditure under the same heading and for the same year was, in the case of the United Kingdom, 8.1d. per train mile, so that there was only a difference of 1.0d., or about 12 per cent., against the railways of the United States.

On comparing this item of 8.5d. per train mile with the 12d. per train mile which we found to be the average cost of motive power per train mile on Mr. Dorsey's ten selected lines, the difference is so startling as to suggest either that on the latter lines the average expenditure on this account is considerably higher than that of the country as a whole, or that the locomotive expenditure has largely increased in the interval. Both reflections are probably more or less accurate.

It is certainly true that since 1880 the average load carried per train mile has been considerably augmented, and it may safely be assumed that locomotive expenses have proceeded on the same lines.

The considerations just stated naturally lead up to that of the comparative earning power of English and American locomotives. This question, while not less important than that which has been already dealt with, is even more readily demonstrable by figures.

In the United Kingdom, the total number of locomotives returned as being in the possession of all the railways in 1884 was 14,827. The total gross receipts from all traffic for the same year was 67¾ millions sterling. The gross earnings of each locomotive would therefore appear to have been about £4,586.

In the United States, the total number of locomotives returned as belonging to the railways as a whole was 23,823, and the gross earnings from all sources amounted to about 202 millions sterling, so that the average gross earnings per locomotive amounted to about £8,476. It would, therefore, seem as if the American locomotives each earned a sum of £3,890, or 84 per cent., more than the locomotives on English lines. It must not, however, be forgotten that, in the United States, the railways have a considerable revenue from coal lands and other sources, with which locomotives have really nothing to do. In the returns for 1883, the gross earnings from passenger and freight traffic are returned at 188 millions sterling, so that there was a difference of about 14 millions earned from other sources than transportation.* Even, however, when we have deducted this last-named sum from the 202 millions returned as the gross revenue from all sources, there still remains a really astounding difference in favor of the earning power of the American locomotive.

When we come to consider the net earning capacity of English and American locomotives, we find equally remarkable differences. The total net receipts from railway working in the United Kingdom in 1884 amounted to 33¼ millions sterling, which corresponds to an average of £2,246 per locomotive; whereas, in the United States, the net transportation earnings amounted to a total sum of 73 millions sterling, giving an average of £3,064 per locomotive, which is £818 per locomotive, or 36 per cent. higher than the average for the United Kingdom.

At the first blush it would appear that this greater earning power of American locomotives must be due either to the existence of a higher range of rates and fares in the United States, or to the fact that they run a considerably greater average mileage than the locomotives in our own country, or to both causes combined.

There is no reason for supposing that the first of these presumed influences has anything to do with the matter, since the average charges for the transport of both goods and passengers, but especially the former, are much lower on American than on English lines, or indeed on any lines in the world.

We come, then, to consider how far the apparent superiority of American locomotive earnings is affected by the greater mileage which it would appear that they must run.

The total number of train miles run by the 14,827 locomotive engines in the United Kingdom was 272,803,000, being an average of 18,395 miles per engine. In the United States, the 23,823 locomotives ran a total distance of 538,011,000 train miles, being an average of 22,583 per engine. In the United States, therefore, each locomotive covered during the year 4,188 miles, or 23 per cent., more than the locomotives of the United Kingdom.

It is, however, necessary to proceed further even than this before we can get at the whole truth of the matter. After all, the real secret of the higher average earning capacity of the American locomotive is not due so much to the greater average mileage which it performs, as to the greater average load which it draws. This is sufficiently evident from the circumstance that, while the average gross receipts per train mile in 1884 amounted in the United Kingdom to 4s. 9d., they were not less than 7s. 5d. in the United States, showing a difference of 2s. 6d., or 53 per cent., in favor of the latter country, and that, too, notwithstanding the very much lower range of rates that prevails on American railroads.

Unfortunately, there are no reliable materials at command for a comparison of the average weight of the live or paying load in the two countries. In the United States, the number of tons carried one mile in 1883 was returned at 44,065 millions, and by dividing into this sum the 350 millions of train miles run by goods trains, it would appear as if the average number of tons carried per train mile was 126.† In the absence of any specific returns of ton-mile traffic on English lines, any attempt to compute the average weight of the trains would necessarily be conjectural.

The gross and net earning power of locomotives on English lines has shown a decrease within recent years. The gross earnings have fallen from £5,039 in 1874 to £4,611 in 1884; and the net earnings have fallen within the same period from £2,248 to £2,167.

Whether the decrease of earning capacity here exhibited is due to a reduction of the train load, or to a reduction of the average tariff charges, is not apparent on the face of it. The gross earnings per locomotive in the United States was £6,420 in the census year 1880, and £6,800 in 1883.

Coming, now, to deal with the Continent of Europe, we find that the number of locomotives, and the average annual and daily mileage of each, on the principal railway systems —distinguishing the state from the private or companies' lines—was, in 1882, as under:

Statement showing the Total Number of Locomotives in Different Countries, the Number of Train Miles which they have accomplished, the Average Miles Run Annually per Locomotive and the Average Miles per Day.

Countries.	Number of locomotives.	Train miles (1 = 1,000).	Average miles per locomotive per annum.	Average miles per locomotive per day.
Germany—				
State railways.....	8,938	105,613	11,816	32
Private railways worked by state..	932	10,812	11,601	32
Companies' railways.	1,460	18,062	12,371	34
Totals.....	11,330	134,489	11,870	33
Austria—				
State railways.....	410	5,819	14,193	39
Private lines worked by the state...	382	6,029	15,783	43
State railways worked by compn's	50	627	12,540	34
Companies' railways.	2,829	34,668	12,255	34
Totals.....	3,671	47,144	12,842	35
Belgium—				
State railways	1,570	21,550	13,726	38
Companies' railways.	220	2,320	10,545	29
Totals.....	1,790	23,870	13,335	37
France—Lines of general interest—				
State railways.....	376	6,576	17,489	48
State railways worked by companies	18	2,355	.. ..	..
Companies' railways.	7,496	122,822	16,385	45
Lines of local interest —Private railways.	198	4,106	20,737	57
Totals....	8,088	135,860	16,798	46
Italy—				
State railways.....	1,630	24,642	15,118	41
Luxembourg.....	34	433	12,735	35
Norway.	111	1,557	14,027	38
Netherlands.....	519	11,435	22,033	60
Roumania.....	211	2,307	10,460	29
Russia	5,844	61,940	10,599	29
Finland.....	98	1,177	12,010	33
Switzerland.....	595	7,674	12,897	35

According to these figures, it would appear that the greatest amount of work was got out of the private railways employed on local lines in France; the next greatest on the states lines of the same country; while the third place is occupied by the French private lines of general interest. In Germany, the average appears to be pretty uniform, as regards both state and companies' lines.

In India the average mileage run by locomotive engines varies quite as much as in European countries, as the following figures show:

	Number of locomotives.	Total engine mileage (1 = 1,000).	Average mileage per engine.	Average per engine per day.
East Indian.	536	11,982	22,355	61.2
Great Indian Peninsula.	447	8,943	20,007	54.8
Madras.....	150	2,172	14,478	39.6
Bombay, Baroda & Central India.....	100	2,210	22,101	60.6
Eastern Bengal	48	1,019	21,231	58.1
Said, Punjaub & Delhi..	159	3,306	20,781	56.9
Oudh & Rohilcund....	125	1,781	14,248	39.0
Indus Val. & Candahar.	156	2,195	14,069	38.5
Nizam's	9	311	34,514	94.5
Totals and averages..	1,730	33,919	19,606	53.71

The average mileages show by the East Indian and the Bombay, Baroda & Central Indian Railways are much higher than are generally to be found on European lines. On the other hand, the results shown for the Madras and the Oudh & Rohilcund lines are below the European average.

It is, however, to be borne in mind that the question of the average daily or yearly mileage of a locomotive engine is not to be determined by its own capacity alone. It is a problem that has other factors surrounding and influencing it, that must be taken into account. One of these is the most economical rate of speed. Another is the endurance of the men in charge.

The greatest proportion of the locomotives employed in the principal countries of the world are engaged on goods traffic. That traffic may be regarded as worked with a minimum of economy at the rate of 15 to 18 miles per hour. If the lower figure is taken, it is clear that, unless the enginemen are to be kept on duty for more than ten hours per day, it is not economically practicable to run the same engine for more than 150 to 160 miles per day.

Sir Daniel Gooch specifically stated to the Royal Commission in 1866 that on the Great Western line the average to which the engines were generally worked was about 160 miles per day He added, however, that without undue wear and tear an engine should do as much as 200 miles per day, if the endurance of the men permitted.

In the United States most of the principal lines now adopt a system known as "first in, first out," which is designed to obtain a higher average mileage from the locomotive without exacting too much from the men in charge. The principle of the system is, that the next engine staff or crew in order shall take the next engine in order, and thus, by having many more engine-hands than are absolutely required to man the locomotives, something like 50 per cent. more service is got from the engines. By the adoption of this system the Pennsylvania Railroad Company increased the annual mileage per locomotive from 19,244 miles in 1870 to 27,644 in 1881.

Regarding the cost of working locomotive engines over a series of years, it appears that the average has within the last few years shown a substantial decline. On the principal British railways the decrease has varied from a minimum of 21 per cent. on the Lancashire & Yorkshire and North-eastern railways to a maximum of 30 per cent. on the South-eastern. In only one case—that of the Southwestern—has there been an increase in the later year.

In order, however, to fully appreciate the extent of the economy that has been effected in locomotive power, it is necessary to go much farther back than 1874. The most remarkable results in this direction took place prior to that date

---

* Paper on "The Repairs and Renewals of Locomotives," by Alex. McDonnell. *Minutes of Proceedings of the Institution of Civil Engineers*, vol. 48, pp. 7, 18, and 25.

† Because, in the first place, it takes a hundred cars or so in a train, and, in the second place, it burns a great deal of anthracite slack, which is full of dirt, but costs nothing.—EDITOR.

* Not included in reports of *earnings*. The 14 millions were for transportation—mails, express, etc.—EDITOR.

† And 133 tons in 1884 and 142 in 1885.—EDITOR.

In 1865, locomotive and traffic charges amounted to 64.95 per cent. of the whole, and in 1884 they were 27 per cent. of the whole cost of working per train mile. The variations which this item had undergone up to 1867 are thus referred to in the report of the Royal Commission issued in that year.

"The Reports of the Board of Trade show the following to have been the cost per train mile for 1840:

	d.
Coke	8.356
Oil	0.360
Wages of enginemen and firemen	1.510
Wages of laborers and cleaners, etc.	1.910
Superintendent, clerks, office charges, firemen	2.040
Repairs	3.549
Sundries	0.936
Total	18.661

"Soon after that time an essential improvement took place in the construction of engines by the introduction of the system of working steam expansively, and in 1845 the following appears to have been the cost per train mile on the Great Western Railway:

Items.	Passenger trains. d.	Goods trains. d.
Cost of repairs	3.03	2.34
" coke	3.13	5.26
" enginemen and firemen's wages	1.34	1.16
" general charges	1.64	1.94
Total	9.14	10.70

"On the Great Western Railway, the cost in 1866 was as follows:

	d.
Fuel	1.71
Wages of enginemen and firemen	1.49
Wages of cleaners and cokemen, etc	.43
Oil, tallow and sundry stores	.28
Wages and materials for repair and renewal of engines and tenders	3.24
Water, including pumping-engines	.18
Salaries of superintendents	.16
Gas rates, buildings and fire charges	.13
Total	7.62
Or, more accurately, as deduced from the cost and mileage	7.65

"This average may be resolved into 6.75d. per train mile for passengers, and 8 5d. per train mile for goods.

"The repairs to engines and carriages, including the rent of wagons which the company hire, amounted to 3.57d. per train mile; hence the average cost of a train for all these charges was 11.22d. per mile run in 1886."

The other items of expenditure which make up the total expense of the trains on the Great Western Railway are shown in detail in the following statement supplied by Sir Daniel Gooch:

Items.	Cost per train mile. s.	d.
Maintenance of way	0	6.35
Locomotive	0	7.65
Carriage and wagon repairs	0	3.37
Rent for wagons	0	.19
Traffic charges	0	6.91
General charges	0	2.74
Compensation	0	.45
Furniture, etc	0	.13
Working joint lines and stations	0	.99
Fire insurance	0	.07
General office expenses	0	.62
Government duty	0	1.12
Miscellaneous expenses	0	.04
Rates and taxes	0	1.10
Bad debts	0	.06
Stamps for debentures	0	.02
Total	2	7.81

These figures sufficiently prove not only the great variations that have occurred in the cost of locomotive power as between one period and another, but also the relation that this item of expenditure bore to all the others. It is necessary to remember, in regard to these figures, that the economy is much greater than it appears on the surface, since the size and power of the locomotives have been very greatly increased, and the average train load has also been augmented.

The following statement, which has been compiled from the reports of the London & Northwestern Railway Company, shows in what items the economy has chiefly taken place over the last ten years:

Items.	Total expenditure for period 1876-85. £	Average per train mile. d.	Expenditure in 1885. £	Average per train mile.
Wages	4,323,829	2.9	466,600	2.8
Fuel	2,623,769	1.7	288,074	1.7
Water	107,844	0.07	8,485	0.05
Oil and stores	463,866	0.31	54,707	0.32

There are many engineers who contend that the English locomotive is still an expensive machine as regards fuel consumption. Mr. Crampton, whose engines have been worked with such signal success for many years on the Northern of France, has recently had a report from the engineer-in-chief of that line, intimating that the average consumption of fuel in his engines over twelve years has varied from 24.8 lbs. to 29.9 lbs. per mile. This figure, on the face of it, appears to compare very favorably with the average of English lines, but it is needless to remark that it is not the *quantity* of fuel alone that is to be considered. The weight of the load carried the *quality* of the fuel burned, the rate of speed, the condition of the locomotive, and other points equally manifest must exercise each its share of influence in the determination of this problem.

Car Accountants' Association.

The Committee appointed at the last meeting of this Association to investigate and report a plan for reporting the individual movement and mileage of cars, has issued the following circular, addressed to railroad managers:

At the annual meeting of the Car Accountants' Association, held at Buffalo, N. Y., June 15 and 16, 1886, the undersigned were appointed a committee to consider the subject of daily individual movement and mileage reports, and present a plan for the successful working of the same.

The Committee are a unit as to the desirability and feasibility of the method of reporting movements and mileage of cars, and will probably have no difficulty in carrying the same into effect. We are met, however, at the outset of our labor with this fact, viz.: That while we personally are convinced of the desirability of a change in the manner of reporting the movements and mileage of cars, to some system which will give us a check upon the reported mileage earnings of cars when away from the home road, yet until we can secure the consent of the management of the railroads of the country to a practical demonstration by agreement to give such a plan as might secure the endorsement of a majority of this Association a trial, we feel that it would be useless to spend our time in working out a system. We come before you then at the beginning of our labors, asking you to consent to change the present system of reporting the movements and mileage of cars, and to substitute therefor the Daily Movement and Mileage Report.

In connection with this request we beg to present for your earnest consideration the following as among the more important reasons.

1. We claim to be able to show beyond the peradventure of a dispute, that under the system of reports now in vogue, you are unable to know what your cars are doing when off the home road.

2. That the car service department is the only department in which you have not a check upon the earnings reported to you.

3. *Poor's Manual* for 1886 shows that at the close of the fiscal year 1885 there were in the United States 805,500 cars, which, at an average valuation of $300, gives $241,650,000 invested, and we submit that the closest possible scrutiny should be given to the earnings of this very large investment, which, at the lowest estimate, should yield an income in car mileage of $56,385,000 per year.

We desire to say to you that this change will entail an additional expense in this department—to what extent we, of course, without practical experience, are unable to state definitely, but in our judgment it will not exceed 15 per cent.; and we believe, also, that this additional outlay will be largely compensated for, if not more than balanced, by the better service of the present equipment, rendering outlay for an increase of the same unnecessary, and in compelling full returns to be made of mileage earnings.

Kindly give this matter your early attention and advise the Chairman of the committee of your conclusions. Should you desire further information on the subject before reaching a conclusion, it would afford the Committee pleasure to call upon you at such time and place as will best suit your convenience, upon receipt of a notice to that effect.

C. J. FELLOWS, Cleve., Col., Cin. & Ind.
E. C. SPALDING, Western & Atlantic.
D. W. MOOAR, Grand Rapids & Indiana.
} Committee.

Contributions.

The Breakages of the New Pennsylvania Joint.

The Pennsylvania Railroad Company,
PHILADELPHIA, Dec. 4, 1886.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Replying to the very important postscript in the *Rail Joint Gazette* [advertising columns of the *Railroad Gazette*] of Dec. 3, I would like to make a few remarks.

In the first place, the new No. 4 angle bar is not breaking where it has a fair chance, as the following statement will show:

1886.	No. of splices used.	No. of splices broken.
U. R. R. of N. J. Division	59,000	4
Penn. R. R. Division	95,000	136
Phila. & Erie R. R	15,500	none
Northern Central Ry	29 000	none
Phila., Wilm. & Balt. R. R.	80.000	4
West Jersey R. R	14,000	none
Camden & Atlantic R. R.	3,000	none

"The big 4" has not been thrown away by any means. Almost any trackman knows that you cannot use the same splice for a 4¾ in. rail as for a rail 5 in. high, and as it is our intention to increase the weight of the rail on the main track and make it considerably higher than the section we are now using, it is necessary to get a splice to fit it. We still propose to use "the big 4" on our 60 and 70-lb. rails as usual.

I fully agree with the writer as to the truth of the old proverb that "Experience keeps a dear school," etc., and this is the reason why we do not adopt a form of joint which we have tried two or three times before, and for which experience we have paid dearly, and do not think it is necessary to get burnt twice with the same fire.

WM. H. BROWN, Chief Engineer.

[Statements made in our advertising columns of course we cannot be responsible for.—EDITOR RAILROAD GAZETTE.]

Compound Locomotives.

HANOVER, Nov. 18, 1886.

TO THE EDITOR OF THE RAILROAD GAZETTE:

With much interest I have read the well put description of our compound locomotives, as contained in your issue of Oct. 15. But I must beg to state that what you say of the tractive power of the compound engines of my system is not quite true, and not in accordance with the results of practice, as I shall show by the following:

In regular work the tractive force of a locomotive engine depends not only upon the cylinder power and actual steam pressure, but primarily on the rate of steam generation. Therefore, with a certain speed, it is not possible to gain more tractive power, or to employ a larger cut-off than the steam generation permits. Now the advantage of the compound engine is that it develops more power from the same quantity of steam, and therefore it proves more efficient than an ordinary engine with the same boiler, in all cases, when the cylinders are of sufficient capacity. Our ordinary passenger engines can be worked with cut-offs of 25 and 20 per cent. at speeds of some 40 and 50 miles an hour. To give more tractive power than corresponds to such points of cut-off and speed, the generation of steam is not sufficient with our Westphalian coal, and any larger cylinder power cannot be used. The compounds work ordinarily on lines with gradients of $\frac{1}{200}$ to $\frac{1}{300}$ (26.4 to 17.6 ft. per mile) in the 30 per cent. to 40 per cent. notches; seldom with 50 per cent.; and have for their work ample cylinder power.

Of course, with American engines, the conditions will be the same, and the Chicago, Burlington & Quincy engine you have compared with our passenger engine will not be capable of maintaining a pressure on the pistons of more than half of the boiler pressure, if traveling at a moderate speed. If at a speed of 40 miles per hour, the engine develops 600 H. P., it only exerts a tractive power of some 5,500 lbs.

The English single engines you compared with my compounds can never get a tractive force of 9,000 lbs., first, as stated, for want of steam; secondly, for want of adhesion; therefore it is not true that these engines might pull heavier trains than my compounds.

As a practical proof of the greater efficiency of the compounds as compared with other engines of similar dimensions but 10 atmospheres (140 lbs.) pressure, I may state that the following loads are drawn by both types on a nearly level line:

	Fast trains, 40 to 50 miles.	Express trains, 50 miles an hour.
Compound engine	240 tons	200 tons
Ordinary engine	180 "	140 "

Also, what you say about the disadvantageous results of the compound goods engines is not true. On long gradients of 1 in 100 both the ordinary engines and the compounds, of which I sent you the drawings some time ago, take loads of 400 tons, the latter with higher speeds than the former. On more level lines with 1 : 300 (17.6 ft. per mile) gradients the compounds draw trains of some 1,060 tons against 950 by the ordinary engines. All these figures as given are for regular service. The steaming of the compounds is always much better than with other engines, want of steam being scarcely known with them. For these reasons I believe my compound engines would give the same satisfaction in America that they give here, and having joined in this matter with Mr. Worsdell, of Gateshead, Mechanical Engineer of the Northeastern Railway, formerly of the Pennsylvania Railroad, I hope soon to have some trial engines there. VON BORRIES, Locomotive Inspector.

[Mr. von Borries is undoubtedly correct in his position that at high speeds of 40 miles per hour or more the difficulty is with the boiler capacity, and not at all with either the adhesion or the cylinder power, both of which can develop more power at such speeds than the boiler can supply. But the point we made, or intended to make, was that the ordinary Burlington engine referred to, with practically identical boiler power, was capable of exerting on some short stretch of heavy grade a greater tractive power than the von Borries engine in the proportion of 12,540 to 8,500, at the expense of a merely temporary reduction of speed, while on the remainder of the line it would be able to maintain as high speed as might be desired, although with somewhat less economy of fuel.

Since resistance is approximately as the square of the speed, if we should allow that the ultimate speed is directly as the economy with which the same amount of generated steam is used in the two engines, and that the compound engine shows 17.1 per cent. more economy, as claimed; then the ultimate speed of the ordinary engine will be only $\sqrt{\frac{100}{117.1}}$ per cent. less than with the compound, or as 92.4 to 100, or as 55½ to 60 miles per hour. Practically, however, the ordinary engine can maintain as high speed as is ordinarily desired for the fastest trains on the greater part of any division, while the possible loss of the chance to haul a very heavy train for a short distance up some steep grade at 25 or 30 miles an hour is serious matter in this country, where very heavy passenger trains are getting to be the rule. The hesitation in this country in respect to compound engines may be mistaken, but it undoubtedly arises in good part from this cause; the fear that the unquestioned economy of fuel per horse-power may be dearly purchased, first, by some increase in the complication of the machine and cost of repairs, which would be a comparatively small matter, and secondly, that it may be accomplished by some diminution of hauling capacity, which would be a very serious matter; to which may be added, thirdly, that there is still considerable room for doubt as to just what is the best type of compound engine, which seems to be undergoing test as fully as is necessary abroad.—EDITOR RAILROAD GAZETTE.]

The Proper Assumptions for Live Load of Bridges.

WOONSOCKET, R. I., Nov. 22, 1886.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I have just read the article on the subject of live loads for railroad bridges in your issues of Sept. 17, Oct. 1 and 15. I make bold to send you a reduced copy of my diagram of loads, for the purpose of adding my voice in favor of the reform that you suggest.

Some three years ago I became thoroughly tired of calculating strains to fit "bridge buyers" specifications of wheel loads and spaces, and was convinced that a series of uniform loads per foot might be adopted that would be much more satisfactory to use, and give strains as near those that actually occur as the more complicated separate wheel loads.

For the past two and one-half years I have been making designs for "bridge buyers" and could assume such live loads as I saw fit. The diagram mentioned above shows the loads that I have adopted.

This diagram was formed by using the two engines shown herewith in fig. 1; they are more or less typical.

By means of the very excellent formulæ given by Mr. J. C. Bland in *Engineering News*, Vol. XI., p. 56, the maximum moments were computed for spans at 2 ft. intervals between 10 and 100 ft., and for 110, 120 and 150 ft. The line is so nearly straight above 100 ft. that closer determinations were not necessary.

The maxima thus obtained were considered as centre moments and the equivalent uniform loads per foot obtained; to these was added $\frac{20{,}000}{\text{span,}}$ and the sums used as ordinates of the curve. This $\frac{20{,}000}{\text{span}}$ is equal to a single load of 10,000 lbs. placed anywhere on the span, and is intended to cover the hammering due to bad rail joints or flat wheels, the downward thrust of the connecting-rod, counterweights, etc., generally covered by the convenient word *impact*.

This gives us 50,000 lbs. on one axle for short spans, precisely as you recommend.

I use the diagram as follows: For all stringers and short girders with flanges of uniform section the whole length, and for chord strains of all truss bridges, use the loads given by the diagram for the corresponding span; for floor beams use $l \times$ (*load per foot corresponding to the span*) $= 2\,l$, when l is the panel length. For web members of trusses use panel loads same as for chord strains, headed by a single panel load equal to the floor beam load obtained as above. For web shears in girders, draw a vertical line at a distance from centre of end-bearing equal to the strain depth of the girder, and lay off on it ⅛ the total uniform load. On a vertical at centre of girder lay off ⅝ of this ⅛, and join the two points by a straight line; this line, prolonged to meet a vertical through the centre of end-bearing gives the reaction for proportioning the bearing and the ordinates give the shear at any point.

The true moment curve is not a parabola, but is rather a horizontal line for a space at the centre of span, and a parabola connecting the ends of this line with the ends of the span. The length of this horizontal line varies for different spans. I have not yet found a satisfactory law governing its length. Of course this peculiarity makes no difference when the section is not reduced at the ends.

I have used this diagram for the past two years, and am well satisfied with the relative loads for different spans—that is, with the general shape of the curve; whether or not the loads are right in amount is open to question. I am considering if they ought not to be increased for future use.

There are several other topics discussed in your articles that would be interesting to argue, but I forbear. J. P. SNOW.

WILMINGTON, Del., Dec. 1, 1886.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Your able efforts to introduce a much needed reform in bridge specifications contained in the articles on "Good Practice in Bridge Buying," and "Heavy Bridges and Economy," in your issues of Sept. 17 and Oct. 1 and some subsequent numbers, deserve the encouragement, and I trust will receive the support, of all who are interested in bridges.

Believing, as you state, that a possession of the facts by *bridge buyers* is of primary importance, I have endeavored to add a little light by preparing two briefs of a 255-ft. span for comparison; one for a live load of two "typical" Consolidation engines and a train of 3,000 lbs. per foot, and the other for a uniform live load of 2,900 lbs. per foot, with a single concentrated load of 25,000 lbs. rolling on the uniform load. In these briefs the most favorable aspect is given to present practice by taking one type of engine, and calculating the chord strains for but one position of the train. The resulting strains will be seen to be practically the same, while the labor of calculation in one case is more than double that in the other.

In dealing with the engine loading, a preliminary process of finding the proper positions of train to give the maximum strains in different panels is usual with some engineers, and is necessary when the average engine load much exceeds the train load, or at least two positions should be taken.

If to this is added a variety of engines, it may readily be seen to what extremes the labor of calculation can be carried.

One advantage of the uniform loading, as you have pointed out, lies in the fact that all calculators will obtain the same results, where with engines these will depend on the positions assumed for the train.

In the matter of adopting a heavier rolling load which shall anticipate future requirements, I would heartily indorse the 3,500 lbs. uniform load, but would deem 35,000 lbs. more than sufficient for the concentrated load when combined with the uniform load in the manner proposed. Bridges proportioned for this loading will weigh but 10 per cent. more than for Mr. Wilson's loading, and will have an insured life, much longer than the bridges of the now usual strength, although there are present indications that even this strength may soon become too small.

The pre-eminence of American bridge designs, shown in a very gratifying way in the Hawkesbury bridge competition, has been attained under a system of awarding contracts which it would seem unwise to change to any important extent, although it is not clear that considerable improvement cannot be made.

The system of an open competition on a simple specification, besides offering the greatest inducements to invention, has an educational element of great value. The experience of the manufacturers, together with the ideas of outside engineers with whom they are in constant intercourse, is by this means brought before the railroad engineer, to whom such information would otherwise be in a measure inaccessible.

It may be urged, on the other hand, that the railroad engineer who needs to be thus educated is not competent to decide an award, and ordinarily he is not, as it is unreasonable to expect a man with the multifarious duties of the rail road engineer to be an expert in such a specialty as bridge designing, and unless the road is large enough to have such an expert in its employ, good business policy would dictate submitting the matter to a consulting engineer.

The railroad company should issue a *complete* design to bidders, or simply a specification. A strain sheet which might be the production of an inferior mind would only tend to hamper the design. The specifications can be made to cover all important features, and if it is desired to give the manufacturer discretion in details, he should have the full measure of such liberty. The general introduction of the heavier live load will do much to simplify such matters, and I concur in your opinion that the cost of the extra weight of bridges will be more than compensated by the saving in other items.

The experimental elements of bridge-building are gradually being eliminated, and bridges are becoming more articles of manufacture, and as such will be subjected to much the same custom as obtains with machinery and other articles of manufacture.

If specifications are maintained with any degree of uniformity, it will be possible to build standard bridges, just as standard turn-tables are now built, and a competition of standards will do much toward obtaining economical results.

The probability of being able to use the same drawings and templets will be an item of considerable saving, even if standards should not be adopted. GEO. H. PEGRAM.

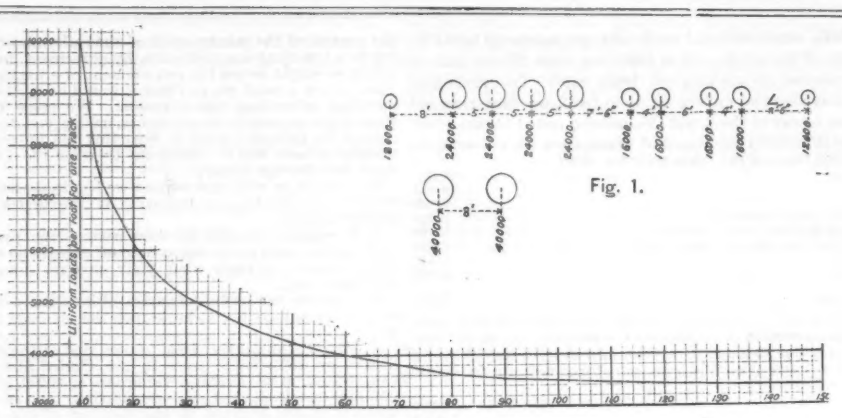


Fig. 2.

Diagram Showing Uniform Load per Foot, Giving Equivalent Strains to those Obtained by Separate Computation of two Engine Wheel Bases, Shown in fig. 1. For any Span from 10 to 150 ft

BRIEF OF 255 FT. WHIPPLE SPAN IN 12 PANELS OF 21.25 FT., DEPTH, 32 FT.

Dead load = 600,000 lbs. = 25,000 lbs per truss panel.
Live load = 2 typical Consolidations, followed by 3,000 lbs. per foot train. Concentrations for one truss =

$a = [6 \times 7 + 12 \times (14.5 + 19) \times 2 + 8 \times 4] \times \frac{1}{21.25} = 41.300.$

$b = [12 \times (2.25 + 6.75) + 8 \times (17.25 + 9.75 + 14.75 + 20.25) + 6 \times 1.75] \times \frac{1}{21.25} = 28.9.$

$c = [8 \times (1 + 6.5 + 11.5) + 6 \times 19.5 + 12 \times (2 + 6.5 + 11 + 15.5)] \times \frac{1}{21.25} = 32.4.$

$d = [12 \times (5.75 + 10.25 + 14.75 + 19.25) + 8 \times (2.25 + 7.75 + 12.75)] \times \frac{1}{21.25} = 36.8.$

$e = [8 \times 8.5 + 13.5 + 19, + 18.5) + 1.500 \times 15.5 \times 7.75] \times \frac{1}{21.25} = 30.8.$

Common panel $1.500 \times 21.25 = 31.9.$

Chord Strains:

Live =	41.3	28.9	32.4	36.8	30.8	31.9
Dead =	25	25	25	25	25	25
	66.3	53.9	57.4	61.8	55.8	56.9

56.9 56.9 56.9 56.9 56.9

Dotted System:

Reaction $= [66.3 \times 11 + 57.4 \times 9 + 55.8 \times 7 + 56.9 \times (5 + 3 + 1)] \times \frac{1}{12} = 179.9$, say 180.0.

$aa = [180.0 \times 1] \times \frac{21.25}{32} = 119.500.$

$bb = [180.0 \times 3 - 66.3 \times 2] \times \frac{21.25}{32} = 270.5.$

$cc = [180.0 \times 5 - 66.3 \times 4 - 57.4 \times 2] \times \frac{21.25}{32} = 345.3.$

$dd = [180.0 \times 7 - 66.3 \times 6 - 57.4 \times 4 - 55.8 \times 2] \times \frac{21.25}{32} = 345.9.$

Fig. 1.

Full Line System:

Reaction $= [53.9 \times 10 + 61.8 \times 8 + 56.9 \times (6 + 4 + 2)] \times \frac{1}{12} = 143.000.$

$a' = [143.0 \times 1] \times \frac{21.25}{32} = 95.0.$

$b' = [143.0 \times 2] \times \frac{21.25}{32} = 190.0.$

$c' = [143.0 \times 4 - 53.9 \times 2] \times \frac{21.25}{32} = 308.2.$

$d' = [143.0 \times 6 - 53.9 \times 4 - 61.8 \times 2] \times \frac{21.25}{32} = 344.5.$

Both Systems combined:

$a + a' = 119.5 + 95.0 = 214.500$
$a + b' = 119.5 + 190.0 = 309.700$
$b + b' = 270.5 + 190.0 = 460.500$
$b + c' = 270.5 + 308.2 = 578.700$
$c + c' = 345.3 + 308.2 = 653.500$
$c + d' = 345.3 + 344.5 = 689.800$

Web Strains:

Length of short tie $= \sqrt{21.25^2 + 32^2} = 38.4$;

$$\text{Secant} = \frac{38.4}{32} = 1.2$$

Length of long tie $= \sqrt{42.5^2 + 32^2} = 53.1$;

$$\text{Secant} = \frac{53.1}{32} = 1.66$$

Live loads..	41.3	32.4	30.8	31.9	31.9	31.9*

* *Note.*—The load on the suspended panel is considered as divided between the systems.

Live load shears:

$c = [41.3 \times 10 + 32.4 \times 8 + 30.8 \times 6 + 31.9 \times (4 + 2 + ½)] \times \frac{1}{12} = 88.5$

$d = [41.3 \times 9 + 32.4 \times 7 + 30.8 \times 5 + 31.9 + (3 + + ½)] \times \frac{1}{12} = 72.0$

$e = [41.3 \times 8 + 32.4 \times 6 + 30.8 \times 4 + 31.9 \times (2 + ½)] \times \frac{1}{12} = 60.6$

$f = [41.3 \times 7 + 32.4 \times 5 + 30.8 \times 3 + 31.9 \times ½] \times \frac{1}{12} = 46.6$

$g = [41.3 \times 6 + 32.4 \times 4 + 30.8 \times 2 + 31.9 \times ½] \times \frac{1}{12} = 37.9$

$h = [41.3 \times 5 + 32.4 \times 3 + 30.8 \times ½] \times \frac{1}{12} = 26.6$

$k = [41.3 \times 4 + 32.4 \times 2 + 30.8 \times ½] \times \frac{1}{12} = 20.4$

$l = [41.3 \times 3 + 32.4 \times ½] \frac{1}{12} = 11.7$

	Live	Dead	Vertical	Inclined
a = Reactions	180. +	143. =	323.0 × 1.2	= 387.600
b =			= 66.300	
c =	88.5 +	25. × 2.5	= 151.0 × 1.2	= 181.200
d =	72.0 +	25. × 2.	= 122.0 × 1.66	= 202.500
e =	60.6 +	25. × 1.5	= 98.1 × 1.66	= 162.800
f =	46.6 +	25. × 1.	= 71.6 × 1.66	= 118.900
g =	37.9 +	25. × 0.5	= 50.4 × 1.66	= 83.700
h =	26.6 +	25. × 0.	= 26.6 × 1.66	= 44.200
k =	20.4 —	25. × 0.5	= 7.9 × 1.66	= 13.100
l =	11.7 —	25. × 1.	= —	

Note.—In the notation for web members the post whose

NOTE, FIG 2.—The top row of letters refer to the corresponding spaces *on the bottom chord*, and not the top. They were placed on top only for the convenience of the engraver.

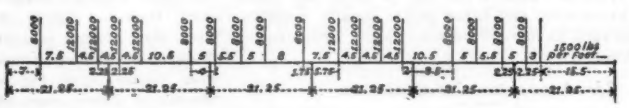


Fig. 1.

Fig. 2.

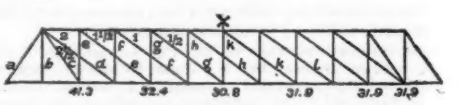


Fig. 3.

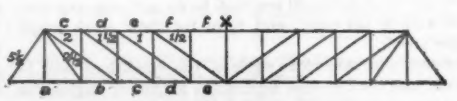


Fig. 4.

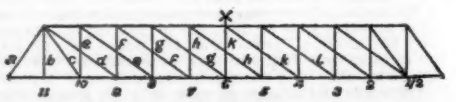


Fig. 5.

strain is the vertical component of the tie has the same letter. Eight thousand pounds should be added to each post strain, as given above, for the proportion of the dead load (one-third) acting at the top chord panel.

BRIEF OF 255 FT. WHIPPLE SPAN, IN 12 PANELS OF 21.25 FT., DEPTH 32 FT.

Dead load = 600,000 lbs. = 25,000 lbs. per truss panel.
Live " = 2,900 lbs. per foot + 25,000 lbs. concentrated.

Chord Strains:

$$\text{Panel load} = \frac{2{,}900}{2} \times 21.25 + \frac{25{,}000}{12} = 32.9 \text{ live} + 25{,}000 \text{ dead} = 57{,}900.$$

$$\text{Chord compound for short tie} = 57.9 \times \frac{21.25}{32} = 38.450.$$

" " " long " = 38,450 × 2 = 76.900.

$a = 38.4 \times 5\frac{1}{2}$ 211.2 = 211.200.
$b =$ (a) + (38.4 × 2½ = 96.) = 307.200.
$c =$ (b) + (76.9 × 2 = 153.8) = 461.000.
$d =$ (c) + (76.9 + 1½ = 115.4) = 576.400.
$e =$ (d) + (76.9 + 1 = 76.9) = 653.300.
$f =$ (e) + (76.9 + ½ = 38.5) = 691.800.

Web Strains:

$$\text{Length of short tie} = \sqrt{21.25^2 + 32^2} = 38.4;$$

$$\text{Secant} = \frac{38.4}{32} = 1.2.$$

$$\text{Length of long tie} = \sqrt{42.5^2 + 32^2} = 53.1;$$

$$\text{Secant} = \frac{53.1}{32} = 1.66.$$

10 9 8 7 6 5 4 3
Summations = 30½, 24½, 20½, 15½, 12½, 8½, 6¼, 3¼.

Uniform live load panel co-efficient =

$$\left(\frac{2{,}900}{2} \times 21.25 = 30.8\right) \times \tfrac{1}{12} = 2.57.$$

Concentrated live load panel co-efficient =

$$\frac{25.000}{2} \times \tfrac{1}{12} = 1.04.$$

	Normal.	Inclined.
$a = (30.8 + 25) \times 5\frac{1}{2} + 1.04 \times 11 =$	318.3 × 1.2 =	382.000.
$b = 30.8 + \frac{25{,}000}{2} + 25. =$	68.3.	
$c = 2.57 \times 30\frac{1}{2} + 1.04 \times 10 + 25. \times 2\frac{1}{2} =$	151.3 × 1.2 =	181.600.
$d = 2.57 \times 24\frac{1}{2} + 1.04 \times 9 + 25. \times 2 =$	122.3 × 1.66 =	203.000.
$e = 2.57 \times 20\frac{1}{2} + 1.04 \times 8 + 25. \times 1\frac{1}{2} =$	98.5 × 1.66 =	163.500.
$f = 2.57 \times 15\frac{1}{2} + 1.04 \times 7 + 25. \times 1 =$	72.1 × 1.66 =	119.700.
$g = 2.57 \times 12\frac{1}{2} + 1.04 \times 6 + 25. \times 0\frac{1}{2} =$	50.9 × 1.66 =	84.500.
$h = 2.57 \times 8\frac{1}{2} + 1.04 \times 5 + 25. \times 0 =$	27.0 × 1.66 =	44.800.
$k = 2.57 \times 6\frac{1}{2} + 1.04 \times 4 - 25. \times 0\frac{1}{2} =$	8.3 × 1.66 =	13.800.
$l = 2.57 \times 3\frac{1}{2} + 1.04 \times 3 - 25. \times 1 =$	—	

Railroad Building in 1836.

SHARPSVILLE, Mercer Co., Pa., Nov. 22, 1886.

TO THE EDITOR OF THE RAILROAD GAZETTE:

The following excerpts from "Reports of the Engineers of the Western Railroad Corporation," made to the directors in 1836-37, show some light on the state of the art and the cost of some of the principal materials at that day, which it will be interesting to compare with the present conditions.

"On the Liverpool & Manchester Railroad they have 30 engines; of this number 10 are in daily use, an equal number in the shops undergoing repairs, and the balance laid aside, being of older patterns and less effective than those now made.

"On the Worcester (Mass.) road they have 9 engines, one-third of which are at all times in the shop.

"The actual cost of keeping 10 engines in constant order on the Liverpool & Manchester road for the year ending 30th of June, 1834, exclusive of running them, was £18,300, or for each about $88,200.

"On the Worcester road the actual cost of repairing and running six engines for the year ending June 30, 1836, was $30,690, or, including the interest upon the cost of the stock, $34,470; or, for each, $5,745. * * * Cost of three engines of a larger size than those generally used, say 10 to 12 tons, at $9,000 = $27,000; interest on same, $1,620. * * * Upon a road of grades of 80 ft. and upward, the wear and tear of the engines would be far greater than upon either the Liverpool & Manchester, or the Worcester, from the necessity of using the brakes so frequently upon the descents; the effect of which, it may be incidentally remarked, is quite as injurious to the road as to the engines.

"We shall therefore assume $6,500 as the cost of maintaining the engines in repair, and of running the sames, and this is only about three-fourths of the cost of the repairs above, of those of the Liverpool & Manchester road."

Report signed by: Wm. Gibbs McNeill and George W. Whistler, Engineers; W. H. Swift, Resident Engineer.

Recommending site for station in Springfield, Mass., the Engineers named above say:

"So far as we may be called upon to express an opinion in reference to a position for the depot, which shall best subserve the interests of the Corporation, we think we shall have performed our duty in that respect, when we say that a piece of ground of about three acres in extent will be required, * * * and that the lot of ground shall be about twice the length in the direction of the road, that it may be transversely to the same."

After having declared of the "flat-bar and contanuous wooden string-piece," that "the defects of this mode of construction are obvious," the engineers say:

"Many modifications of the iron edge-rail might be enumerated, but as on a careful comparison of all of them, and after much reflection, aided by our own experience and that of others, we are not enabled to improve on the T rail such as has been adopted on the Boston & Providence Railroad, the Taunton Railroad, the Stonington Railroad, and lastly on the *second* track of the Lowell Railroad, we shall submit estimates of cost on the supposition of its use.

"The construction of these several railroads varies essentially in no particular, save that on the Boston & Lowell Railroad stone sleepers have been substituted for the wooden sleepers which from necessity were elsewhere adopted. The eventual saving, we doubt not, will prove the exercise of a wise economy in imitating the example of the Lowell Railroad where stone can be procured at a reasonable cost. We submit, however, the two following estimates:

"1. Cost of a single track of a similar construction with the Stonington Railroad (which differs from the Boston & Providence Railroad in its continuous *longitudinal sills*), the weight of the rail being 55 lbs. per lineal yard, or 86.42 tons per mile, to wit:

1. Foundations	$2,993.46
2. 1,760 sleepers 7 ft. long × 8 in. thick	528.00
3. 704 cast-iron chairs (or splicing plates), 10 lbs.	352.00
4. 1,152 spikes at 8 cts. per lb.	366.08
5. 86½ tons of iron rails at $60 per ton	5,185.20
6. Laying rails, including excavation of trenches, etc., at $2.50 per rod	800.00
	$10,224.74

"To this must be added the cost of transporting the material, an estimate of which cannot, at this time, be made with accuracy. * * * Our own impression is that the above estimate amply provides for all expenses. * * * The cost of foundations will be so much less than stated (because they will by no means be required throughout the whole distance), that the surplus will suffice for all contingencies.

"2. The cost of a single track, per mile, similar to the second track of the Boston & Lowell Railroad, and based upon the actual cost experienced on that road:

1. Foundations (the longitudinal sill was omitted on the Lowell road) its cost is $646.80 per mile, and is herein included	$2,993.46
2. 1,760 stone sleepers, viz., 352 for the joints, at $2.50 each	880.00
1,408 for the intermediate ties, at $1.50	2,112.00
3. Fitting and moving sleepers, at 50 cents	880.00
4. Spikes as before	366.08
5. Iron rails as before	5,185.20
6. Laying rails at $4 per rod	1,280.00
	$13,696.74

"'Transportation' omitted, and cost would be enhanced because of the greater weight of materials, and we are much inclined to think that the difference in cost per mile between the two modes would vary but little from the sum of $4,000."

We see (above) that the ties were spaced 3 ft. from centre to centre; that rails were in 15 ft. lengths, and that the spikes were hand-made. Aggregate cost of "cast-iron chairs" indicate the price per pound to have been 5 cents. The chairs (10 lbs. per joint) were only about half as heavy at those commonly used about 1850. The average weight of splice-bars (two bars and four bolts and nuts per joint) commonly used at this time is, for rail of 55 to 60 lbs. per yard, 18 to 24 lbs. In the estimate of cost of track "like the Lowell Railroad second track," no "chairs" are named. The "spikes" are estimated to weigh ⅛ lb. each. The item "Foundations" includes the "longitudinal sills" and the cost of laying them. Cost of ties "7 ft. long × 8 in. thick," 30 cents each.

The "stone sleepers" laid on the Lowell road were of granite. On a railroad built from Lexington to Frankfort, Ky., at about the date when the foregoing estimates were made, "stone sleepers" were used. They were made of limestone, and nearly every one of them broke (across the middle mostly) on the first passage of an engine over them, which took place at the "opening" of the lines. I have been told, by persons who were present at this opening, that the sound of the cracking of the ties was like that of a "rolling" discharge of rifles.

COST OF A MILE OF TRACK TO-DAY: 56-LB. STEEL RAIL; 2,750 TIES; FISHED JOINTS, 20 LBS. PER JOINT; 5½ IN. × 3-16 IN. SPIKE:

88 tons rails, $37 per ton delivered	$3,256.00
Splices (1¾ cents for bars, 2.62 cents for bolts and nuts), say 38½ c. per joint; 357 joints	137.45
Ties, 8 ft. long, 7 in. × 3 in., 2,750 at 45 cents	1,237.50
Spikes, 6,110 lbs. at 2¼ cents	137.48
Laying simply, without ballasting	250 00
	$5,018.43

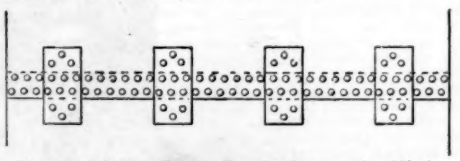
Rails: 90 per cent. 30 ft. long, 10 per cent. 24@28 ft.

J. M. GOODWIN.

Shop Notes.

THE BROOKS LOCOMOTIVE WORKS.

These well-known works, situated at Dunkirk, N. Y., are fairly busy, turning out two engines per week and employing 650 men. The last of 15 American type engines for the Chicago, Rock Island & Pacific is in the erecting shop. These engines have 18 × 24 cylinders and weigh about 83,000 lbs. They have Morse balanced slide valves, and bushed end coupling rods. The crank-pins are of wrought-iron, case-hardened, with very deep and thin collars between the connecting and coupling rod journals. A washer, screwed on the end of the crank-pin, keeps the coupling rods in place. A set screw, tapped through the rod, enters the bush and prevents its either turning in the rod or coming out. These engines differ from the majority of those now built, in having a diamond stack and no extension to the smoke arch.



Sketch of Boiler Seam—Brooks Locomotive Works.

Some Mogul engines with 18×24 cylinders are building for the Illinois Central, and some passenger engines with 17×24 cylinders for the Ohio River Railroad. These engines have wagon-top boilers.

The boilers of four engines building for the Chicago, Milwaukee & St. Paul are of the wagon-top form. The barrel is made in two parallel rings, each ring being made of one plate lapped and double riveted at the longitudinal seams, which are placed above the water line. Instead of a continuous inside welt or butt strip, four inside strips are used, each secured by three rivets to each plate, as shown on the accompanying rough sketch.

Two engines are also building for the Baltimore & Ohio one being a passenger engine with 18 × 24 cylinders and the other a ten-wheeler. These engines have to be built to the railroad company's drawings in every detail. Not only the main parts of the engines must conform to the railroad company's patterns or standards, but all the brass work, gauge, steam cocks, etc., and the ashpans must be made exactly to drawings. If such is the case, it seems somewhat strange that only one engine is required, as the extra cost of special templates and patterns is no greater for 20 engines than for one, and consequently must greatly enhance the cost when one engine only is built for an order.

The shops are well fitted with modern tools, conveniently placed and arranged, so that heavy work can be transferred from one machine to the other by means of jib cranes. A new boiler shop, 100 ft. by 92 ft., is building, which is spanned by a Yale & Towne 10-ton traveling crane. The great span is somewhat unusual, traveling cranes being rarely made over 65 ft. span, but it was adopted, as Mr. Setchel considered that it was necessary to provide room for three rows of six boilers each. The shop is, therefore, of a capacity to handle 18 boilers at a time. The shop is very lofty, with brick walls. The roof is supported by lattice girders, the upper chords of which are constructed with considerable camber. Two steam riveters are used. A special horizontal punching machine is used for punching the holes in the flanged portions of the fire-box and boiler plates.

The erecting shop has ten pits. Doors opposite each pit open on a steam traverse table, by means of which the engines can be put in the paint shop—an isolated building on the other side of the traverse table—or can be shifted from any pit to the railroad siding. The erecting shop is one of the original buildings of the works, and is a convenient shop, though the roof is somewhat low.

A tramway of 2 ft. gauge runs through the works, and goes into every shop, affording a convenient method to handle material.

The pattern store is laid with a concrete floor, has iron doors, and is practically fire-proof. The whole works are lit with the electric light, arc lamps being used.

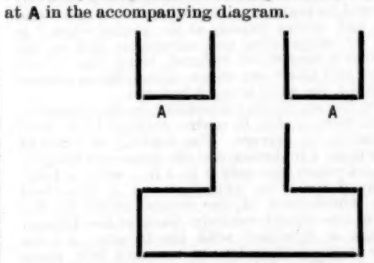
The general offices are located in a handsome new brick building. The drawing office is a fine room nearly square in plan, the superintendent's office being placed in one corner, and the approach being made by a stairway in the centre of the room. This is a convenient arrangement often adopted, and permits the whole wall and window space to be utilized.

THE BUFFALO BOLT AND NUT WORKS.

Messrs. Plumb, Burdick & Barnard, the owners of these works, report business very brisk. They manufacture a great variety of bolts and screws. All the work is forged from round iron nearly to shape, and not turned from hexagonal iron, as is done by some makers. The grain of the iron thus follows the outside contour, and naturally the finished article is stronger. The United States Standard thread is used, but in common with many who have paid considerable attention to the subject they find objections in it.

They say that after a little use the sharp corners are worn off, and the thread is rounded top and bottom as in the Whitworth. They also consider that the angle, 60 degrees, makes the thread too deep for strength. As regards the much disputed point of depth of head and size over flats, they find that a slightly shallower head than the standard really makes the strongest bolt. It is difficult in a forged bolt to upset the head at one heat sufficiently to form the large head called for by the standard.

The lower face of the head is formed, not by a turning tool in a lathe, but by a hollow milling tool with a cutting edge at **A** in the accompanying diagram.



A large quantity of turned engine bolts are made to standard sizes and threads, the heads being left "black" rather than "rough," as they are very neatly finished and exact to size. Where bolt heads are painted, fine finish on the heads is rather useless, and accuracy in size and thread and a fair and square bearing under the head are the essential requirements.

The Strong Locomotive.

A locomotive, which embodies several novel features patented by Mr. George S. Strong, has just been completed and is now running trains on the Lehigh Valley. This engine has been already illustrated in the *Railroad Gazette* for Feb. 5, 1886; illustrations and descriptions will also be found in the enlarged edition of "Recent Locomotives," lately published. The valves are now driven by a single eccentric, and not by the connecting rod as at first designed.

The patents are owned by the Strong Locomotive Co. of New York, which has a capital stock of $1,200,000. A. G. Darwin, ex-President of the Allen Paper Car Wheel Co., is President; George D. McCreary, of Philadelphia, Vice-President; Henry G. Morris, of Philadelphia, Secretary and Treasurer. The directory consists of the officers: George H. Myers, of Bethlehem, Pa.; Thos. F. Rowland, of the Continental Iron Works, Brooklyn; C. C. Worthington, of H. R. Worthington & Co., pumping engine builders; and the inventor himself.

The Strong engine is a radical departure from ordinary practice in locomotive building in the boiler, valves, valve-gear and cylinders and the arrangement of wheels and running-gear. The boiler has two fire chambers, each consisting of a welded and corrugated steel cylinder. Both are joined to a single combustion-chamber by corrugated hemispherical junction plates so formed as to avoid having

LEANDER GAREY.

any flat surfaces, and to do away with any necessity of staying. The combustion-chamber is also a corrugated steel cylinder flanged out to receive the tube-sheet.

There are 309 tubes, 1¾ in. dia. and 11 ft. 5 in. long. The corrugated Fox flues or fire-chambers are each 42 in. dia. and 9 ft. long. The total grate area is 62 sq. ft., and the total heating surface 1,848 sq. ft., which appears to be ample for working heavy trains with low-grade anthracite or bituminous coal.

The cylinders are 20 in. dia. by 24 in. stroke and are made without steam chest, the valves being interposed in the steam passages to and from the cylinders, doing away with much condensing surface, and the gridiron valves give a very large opening into and out of the cylinders. There being four valves to each cylinder, two steam and two exhaust, the moving of the steam and exhaust being entirely independent, permits an early closing or cut off of the steam, and a late closure of the exhaust which travels full stroke at all points of cut-off, producing a very free exhaust.

The motion for the valves is derived from a single eccentric for each cylinder, and the valve gear works entirely on true centres, giving a good distribution of steam for either forward or backward running, and while the motion for both steam and exhaust valves originates from this single eccentric, their motions are entirely independent and are under control separately. The motion of the valves is so arranged that when a valve has covered its ports it comes almost to a rest while the load is on it, and moves rapidly at the period when it is relieved of wear by compression and expansion, and as the travel of the valves is very much reduced, being but 1 1-16 in. for full travel, and 15-32 on steam valves, when cutting off at an early point, the wear is much reduced.

This locomotive has six driving wheels 62 in. in diameter, coupled 5 ft. 7 in. from centre to centre, making 11 ft. 2 in. from extreme centres on drivers. The leading or forward pairs have blank tires, 7 in. broad, and the others are flanged, making the flanged wheel base only 5 ft. 7 in., with a four-wheel truck forward under the cylinders and a two-wheel truck with 42 in. wheels back of the drivers under the fire chambers, which are placed entirely back of the drivers. This trailing truck is equalized with the drivers. All the wheels under the engine and tender are wrought iron, made by Krupp, of Essen. The total wheel base of the engine is 32 ft.

It is the intention of the designer of this locomotive to have all the longitudinal boiler seams welded, and preparations have been made for doing the welding and for testing every part after it is welded and before it is put in the boiler, to 300 lbs. pressure.

The boiler was built at Edgemoor, but the rest of the engine has been constructed at the Wilkes-Barre shops of the Lehigh Valley Road, under the superintendence of Mr. Alexander Mitchell, who has been the pioneer in introducing many improvements in the locomotive, including the consolidation type, which has become so generally adopted.

The engine is very neatly designed and well finished, and rides very smoothly both on curves and tangents. The many novel features about the engine combine to form a very interesting departure from usual practice, and the performances of the Strong locomotive in actual work will be awaited with much interest.

The Limit of Precision in Leveling.

Prof. I. O. Baker, of the University of Illinois, writes as follows in *Engineering News:*

A great diversity of opinion exists as to what should be called accurate leveling, so diverse that nothing would be gained by citing them. According to the theory of probabilities, the final error of a series of observations each of which is subject to error, and is liable to be greater as to be smaller than the true result will vary as the square root of the number of observations. For example, if in measuring a mile the error is one foot, it is probable that the error for four miles will be 2 feet. This is true only when the error of each observation is as liable to be plus as minus, when the only errors are compensating ones. In the above illustration, if the chain were too short, the error in the second distance *due* to *this cause* would be four times as much as in the first distance. In leveling, a method should be adopted which will eliminate all cumulative errors; and, therefore, since only compensating errors remain, the final error should vary as the square root of the distance. The final error due to cumulative errors will vary as the distance, and as it is highly improbable that all cumulative errors will be entirely eliminated, the final error will be a little larger than proportional to the square root of the distance. The precision of leveling is usually assumed to vary as the square root of the distance

It is pretty well established that the error of the most accurate leveling will be 0.005 ft. $\sqrt{distance\ in\ miles}$, and even with the greatest care it may be as much as 0.020 ft. $\sqrt{distance\ in\ miles}$. The first result may be taken as the extreme degree of accuracy attainable. To accomplish this requires skillful observers, the best instruments and plenty of time; ordinarily there are not more than three or four hours of the day on which this class of work can be done, and as a general average not more than one or two miles can be made per day.

It is impossible to establish a limit for work less accurate than the best; the conditions under which it may be done are too diverse. Results of leveling are often given of apparently greater accuracy than the above, but an occasional accurate result, probably more largely due to good fortune than good management, gives no indication as to what results may be regularly expected; naturally it is the most accurate result that is reported. However, the difference in precision between ordinarily leveling and precise leveling, is not as great proportionally as the difference in care, time, etc.; a little increase in accuracy cost a very great increase of effort.

A line of ordinary levels was run on the bank of the Mississippi River,* and checked upon the benches of the precise levels, with an average error of .011 ft. $\sqrt{}$distances in miles. This was about the conditions under which a preliminary railroad survey is made, but is probably more accurate than such surveys usually are.

In some of the branches of the Atchison, Topeka & Santa Fé Railroad, the instructions were to re-run the line whenever the difference between the levels on construction and location was .03 feet between benches about 2,000 feet apart; this is equivalent to limiting the maximum admissible error to .048 ft. $\sqrt{}$ distance in miles.

The amount of work that can be done by an observer in a day is a point about which there has been much debate, and which will never be settled. Leveling is of different kinds, for different purposes, with instruments of different powers and delicacy, on different ground, and with varying atmospheric conditions. Prof. J. B. Johnson, who has had large experience in levels of precision on the U. S. Lake Survey and on the Mississippi River, states that "with a Y level and a target rod, a single instrument should duplicate 30 miles per month, with no greater error than 0.05 feet $\sqrt{}$ distance in miles, or with a level of precision and speaking rod, do the same work with a limit of 0.02 feet $\sqrt{}$ distance in miles.

The Late William Woodcock.

The following circular is issued under date of Dec. 4:

"*To the Members of the American Railway Master Mechanics' Association:*

"GENTLEMEN—It is with very great pain and regret that the General Supervisory Committee announce to the members the death of PRESIDENT WILLIAM WOODCOCK, who died at his home in Elizabethport, N. J., Nov. 27, of typhoid fever. Until further notice all communications intended for the Master Mechanics' Association should be addressed to the Secretary, at Dunkirk, N. Y.

"J. H. SETCHEL, Secretary.

"J. JOHANN, First Vice-President."

TECHNICAL.

Locomotive Building.

The Schenectady Locomotive Works, in Schenectady, N. Y., last week turned out 2 consolidation freight engines for the Colorado Midland road. These engines are the first of an order for 25 for that road.

The Brooks Locomotive Works, in Dunkirk, N. Y., are completing an order for 20 locomotives for the Chicago, Kansas & Nebraska road, the new extension of the Rock Island road into Kansas.

A project is under discussion for the organization of a company to build locomotive shops at Curtis Bay, near Baltimore. A company has already been organized to build car shops and it is proposed to add the locomotive shops hereafter.

The Car Shops.

The Missouri Car & Foundry Co. is considering the question of establishing a branch shop in Kansas City in order to re

* Communicated privately to the writer.

WILLIAM WOODCOCK.

lieve its present works, which are very much overcrowded with work.

The Barney & Smith Manufacturing Co. in Dayton, O., has taken a contract to build 3 parlor cars for the Cincinnati, Hamilton & Dayton road.

The Indianapolis Car Co. in Indianapolis, Ind., has received an order for 250 box cars for the Merchants Despatch line.

The Peninsular Car Co. in Detroit has taken an order for 500 coal cars for the Cincinnati, Hamilton & Dayton road.

The Philadelphia & Reading shops in Reading, Pa., are building 175 new 8-wheel coal cars for the road.

A company is to be organized to build car shops at Curtis Bay, near Baltimore. The incorporators are gentlemen chiefly connected with the Baltimore & Ohio and the West Virginia Central & Pittsburgh roads. The present capital stock is fixed at $200,000, and shops for the building of freight cars only are to be erected at first, but it is expected that the stock will be increased, and passenger shops will be added hereafter.

Adams & Price, in Nashville, Tenn., are building a number of dump cars for the coal and iron mines in that state and in Alabama, and also have orders for a large number of logging cars for different states in the south.

Bridge Notes.

The Keystone Bridge Co. in Pittsburgh has taken contracts to build the new elevated road through Jersey City for the Pennsylvania Railroad Co. The road will be double track and nearly 3 miles long. The company is now at work on the material for the new railroad bridge over the Missouri River at Kansas City, which will be chiefly of steel, and has a number of other bridge contracts on hand. In addition to this bridge work the company is furnishing iron for a new train shed for the Chicago, Milwaukee & St. Paul road in Milwaukee, which will be 90 ft. wide and 600 ft. long, and also the iron for a new building for the Carnegie library at Braddock, Pa. This will be a three-story building, constructed chiefly of iron.

Manufacturing and Business.

The frog, switch and interlocking signal departments of the Pennsylvania Steel Co., at Steelton, Pa., are crowded with orders and are now running overtime. The shops are being enlarged and the company is putting in electric light plants.

The Hazard Manufacturing Co. in Wilkesbarre, Pa., recently shipped a steel wire cable 24,500 ft. in length and 1¼ in. in diameter, to the Third Avenue Railroad Co. in New York. The rope was made in one piece.

The Cleveland Ship Building Co. has been organized in Cleveland, O., for the purpose of building steel and iron vessels. The capital stock is $250,000.

The Wainwright Manufacturing Co., Boston and New York, reports the following sales of feed-water heaters during the month of November: Globe Machine Co., Frankford, Pa.; Fairbanks & Co., Philadelphia; Frank Bigelow, Natick, Mass.; Cambridge Electric Light Co., Cambridgeport, Mass.; Bates, Wightman & Beaman, Westboro, Mass.; S. F. Tolman, Brockton, Mass.; Everett Mills, Lawrence, Mass.; Exeter Water Works, Exeter, N. H.; Samuel L. Moore & Sons, Elizabethport, N. J.; Waltham Gas Light Co., Waltham, Mass.; Howard Clark & Co., Brockton, Mass.; American Optical Co., Southbridge, Mass.; Geo. H. Little, Peabody, Mass.; Porter Manufacturing Co., Syracuse, N. Y.; A. Priestly & Co., Camden, N. J.; aggregating a total horsepower of 1,722. The company reports a brisk business and numerous orders on the books for iron pipe and fittings.

Iron and Steel.

Norristown Furnace, in Norristown, Pa., is shortly to go into blast and will make Bessemer pig iron.

The old Swede Furnace at Norristown, Pa., has been leased by the Philadelphia & Reading Coal & Iron Co. to parties who are preparing to put it in blast.

The Helmbacher Forge & Rolling Mill Co. in St. Louis work full single turn in all departments.

Pequest Furnace, in Warren County, N. J., is running very successfully and making 80 tons a day of Bessemer pig iron.

The Cornwall Bridge Iron Co., at Cornwall Bridge, Ct., has put its furnace in blast, using charcoal as fuel.

The Oxford Iron Co. has its furnace and rolling mill at Oxford, N. J., in full operation.

The blast furnace at Boonton, N. J., owned by the Lord estate, is being repaired and put in order ready to start up. It is understood that the furnace has been leased to parties who intend to run it.

The Rail Market.

Steel Rails.—A number of sales are reported and most of the mills are now supplied with work extending pretty well into next year. Quotations are $35 per ton at Eastern mills, with $35.50, and even $36, named for small orders.

Rail Fastenings—An active demand is reported and quotations are steady at 2.40 cents per lb. for spikes in Pittsburgh; 2.90@3.10 for trackbolts, and 1.75@1.90 for splicebars.

Old Rails—Old iron rails are in demand, but are somewhat scarce, and quotations are $22.50@$23 per ton in Pittsburgh. Old steel rails are quoted at $23@$25 per ton in Pittsburgh.

The Lookout Mountain Cable Railroad.

The Lookout Mountain incline cable road at Chattanooga, Tenn., is nearly completed. The track is all laid and the cable has been stretched, and the cars were to be put on the road this week. The line extends from the base to the summit of Lookout Mountain and is about three-fourths of a mile long. The company which has built the road owns a large tract of land on the summit of the mountain, where it is now laying out parks and building a hotel.

Engineers' Club of Philadelphia.

A meeting was held at the Club-House in Philadelphia, Nov. 20, President Washington Jones in the chair; 15 members present.

The Secretary presented, for Mr. George R. Henderson, a Table of Millimetres and Equivalents in Inches for the *Reference Book*.

Mr. John E. Codman presented an account, illustrated by blackboard sketches, of the results obtained from the recent tests of the efficiency of different forms of boilers now in use by the Philadelphia Water Department. The boilers first tested were four in number, and known as "double-decked," a popular form in Philadelphia, and supposed by many to be an economical steam generator. The lower boiler generally contains about as many tubes as the tube sheet will safely hold; the upper boiler, or drum, is connected to the lower one by two or more necks, and the water is usually carried so as to half fill the upper drum. In the trials mentioned, the height of water was measured from the bottom of the upper drum. For 16 hours it was kept at 5½ in. from the bottom, and for 8 hours 12¼ in. from the bottom. This difference is not very great, but the results obtained show the advantage of keeping the water as low as possible in the upper drum, as, with high water, much that is obtained is only apparent evaporation. An apparent evaporation of 16,000 lbs. of water was obtained per hour for the four boilers, which, when corrected, gave only 16,700 lbs. per hour. The calometrical tests for quality of steam, made at intervals of 30 minutes, gave over 8 per cent. of water in the steam.

With 5½ in. in the upper drum, an apparent evaporation of 16,100 lbs. was obtained per hour, which, when corrected for steam, etc., gave 17,230 lbs. per hour. The calorimetrical tests gave 6¼ per cent. of water in the steam. The evaporation of water per pound of combustible, averaged above 9⅛ lbs. for the 24 hours. Using 34½ lbs. of water from and at 212° Fahrenheit, as the equivalent of a horse-power, the low water gives 500 H. P., against 486 H. P. for the higher water. The coal used was an ordinary quality of Schuylkill pea coal, containing about 16½ per cent. of ashes and clinkers. The second tests were made on the ordinary tubular boiler, set in brick-work and externally fired, arranged so that the escaping gases passed over the top of the boiler and around the steam drum. The boilers were run for 24 hours, all water and coal being carefully weighed and checked at the end of each hour; the dampers were kept wide open, and all the coal that could be burned upon the grates with a natural draught in a chimney 60 ft. high, was put into the furnaces. The calorimetrical test gave very good results, the average of 39 observations showing 0.247 per cent. of water in the steam. The evaporative efficiency of these boilers was 10⅛ lbs. of water per pound of combustible. The rated horse-power of the boilers was 30 H. P. for each, or 60 H. P. for the two tested. The horse-power developed, using 34½ lbs. of water from and at 212° Fahrenheit, was nearly 100 H. P.

Some discussion followed. President Washington Jones said: In the so-called "double-decked boilers" the contracted passages or necks, connecting the upper and lower sections, and through which the steam formed in the lower section, rises to the upper one with such a high velocity as to carry entrained water, which passes to the steam pipe and is credited as steam, unless the calorimeter test reveals its presence. This disposition to carry water is augumented by the increased velocity of the ascending steam, caused by the injudicious crowding of the tubes nearly to the top of the lower section, and by insufficient space between the vertical rows, so that the passage ways through the necks are thereby obstructed. The better practice is to omit such tubes as come immediately under the necks, leaving a space of several inches (say one-half the diameter of necks) between the shell at necks and the adjacent tubes, so as to obtain a more quiet liberation of the steam bubbles. The necks should be of limited diameter, ordinarily from 10 to 14 in., so that the strength of the shell shall not be impaired by the holes cut in it to match the necks. More than two necks are injurious, as the upper and lower sections should not be rigidly bound together, but should be permitted to alter their parallelism, if unequal expansion demands it. The greater quantity of steam formed at the front, or furnace end, of boiler should establish a circulation upwards through the front neck, and downwards through the back neck. This, however, is evidently not the fact, as the quick and frequent fluctuations of the water line, shown by the glass gauge, proves. When a volume of steam, greater than usual, is generated in the front end of boiler, the quickened ascent of the current causes a larger quantity of water to flow through the front neck into the upper section, and the water-line rises momentarily at that end of the section, and is so shown by the glass water gauge; meanwhile, the water is passing down the neck at back end. When the ebullition at front end becomes quieter, and the upward current slower, the water-line falls to a level, or possibly below it, at front end, if the back neck is giving a passage to steam formed at back end of boiler, and so reverses the currents. One requisite of the first importance to the evaporative efficiency of a boiler, is the production and maintenance of a constant current of water, passing, without change of direction, over the heated metal surfaces, so as to sweep off the steam bubbles adhering to those plates, and bringing into their place fresh particles of water to be, in their turn, converted into steam bubbles.

The Secretary announced the death, on Oct. 7 last, of Mr. Frank S. Brock, active member of the club.

Lumber Railroads.

Building railroads to reach pine timber is recognized now as one of the legitimate enterprises in which capital may embark with but little risk and almost certain prospect of handsome gain. Narrow and standard gauge lines are projecting into the timber in all directions, and it would almost seem that the era of railroad logging has but just begun. Many of the old established companies—companies organized to do an exclusively railroad business, and which have no timber interests of their own which they are desirous of developing—are planning new lines and extensions, which, if built, must rely for many years upon the business that the forests will furnish, mostly in the way of handling logs. About all the roads operating in the northern part of the lower peninsula of Michigan, have for some time done a very large business in moving logs, and the present indications are that they are hungry for more traffic of the same character. It is reported that the Chicago & West Michigan and the Detroit, Lansing & Northern roads are considering plans which will result in the building of a large amount of new road in the western part of the state. A part of the scheme will be the extension of the present line of the Chicago & West Michigan from Baldwin to Traverse City, and probably the building of a branch to Manistee, while the northeastern extension, by way of Big Rapids to Alpena, will doubtless extend its sway in that direction. These developments, made, as they largely are, because there is timber to be made conveniently accessible thereby, cannot but prove of benefit to a large number of timber and mill owners, who will be able to save no small sum in the cost of moving mills or logs, whichever they might be compelled to do if no means were provided other than nature affords for getting their logs where it is convenient to saw them. Those who are immediately interested will therefore hail these railway projects with pleasure. They will also benefit the lumber trade in a general way, for wherever a new line of railway goes, cheap building material must follow in large quantities. Besides, it takes a good deal of lumber to construct a new railroad, to say nothing of the consumption to which it indirectly gives rise.—*The Timberman.*

A Large Coal Storage Trestle.

The Lehigh Valley Coal Co. has just let a contract for a $100,000 elevated tramway and coal shed on the ground extending from Twenty-ninth to Thirty-first street, Chicago, adjoining the Chicago & Western Indiana Railroad tracks. The structure is to be 100 by 886 ft., and when completed will form the longest continuous roof-covered business building in the city. It will be of corrugated iron. The company's engineer is authority for the statement that it will possess all of the good and none of the objectionable features of similar structures in the East; that it will be a model in every respect; and will reduce the cost of handling coal, both for re-shipment to outside points and delivery to the dealers of the city to the minimum. Not a coal-shovel will be used in the building, the loading and unloading of cars and the loading of wagons being done by the latest improved machinery. There will be a double cable track extending along the ground floor of the building to the incline at one end, and thence to the roof, where the coal from the tram-cars will be dumped into the several elevated bins, and thence by chute into box-cars for shipment to outside points, or into the wagons of dealers for delivery through the city. The storage capacity of the shed will be about 25,000 tons, and about 7,000 tons will always be kept in the elevated bins ready for instant delivery. Ground was broken Nov. 29, and the builders are under contract to complete the work within 60 days. The structure will only be 20 ft. in height, but its length is so great that a train of nearly 30 cars can be hidden behind it.—*Coal Trade Journal.*

The Sarnia & Port Huron Tunnel.

The Grand Trunk Tunnel between Sarnia and Port Huron has been commenced and will be pushed on rapidly towards completion. Twenty borings made show that rock and clay underlie the strait. The tunnel will be single track, lined with five rings of brickwork and nearly circular in cross section. The entire length of the tunnel will be slightly over one mile, of which 2,300 ft. will be under the river.

An Electric Railroad.

A dispatch from Scranton, Pa., Dec. 3, says: "The latest evidence of Scranton enterprise is shown in the equipment and successful operation of an electric street railway. This novel contribution to rapid transit has just been put in running order by the Scranton Suburban Railway Co., and moves with the regularity of clock work from the centre of the city, at a point opposite the Delaware, Lackawanna & Western Railroad station, to a suburb called Green Ridge, a distance of about 2 miles. Two handsome Pullman cars have been placed on the track and are run smoothly and expeditiously along levels, around curves and up rather steep grades. Each car affords seating accommodations for 26 persons. The motor is in a small compartment in front, and the power is applied by cogs to the two fore wheels. A traveler running along a wire strung at an elevation of a few feet above the car and about midway over the track conveys the power from the dynamo, which is in the works of the Scranton Electric Light Co., to the motor in the car and sets the wheels in motion. This is easily controlled and most effective."

The Driven Well Patent.

Another decision has been handed down in the long-drawn-out litigation over the validity of the patent of Nelson W. Green for the tube or driven well. Judge Colt of the United States Circuit Court at Boston has sustained the patent in a suit brought against the Fitchburg Railroad for infringement. The United States Supreme Court sustained the Green patent some years ago, but as it was by a divided court, the defense in other cases attempted to secure delays in the Circuit Courts by claiming that another case was on the Supreme Court docket. That case, however, was withdrawn, and the defendants paid the royalty and costs. Still another case involving the validity of the patent has been appealed to the Supreme Court, but Judge Colt in his decision, says "that the Circuit Court should follow the decision of the Supreme Court sustaining the patent."

A New Departure in Refrigerator Cars.

Some new express refrigerator cars have been placed on the Erie which differ materially from any yet used. They are designed to run on passenger trains, and have passenger trucks, Miller platform and draw-head, etc. They measure 50 ft. long over the body, and are divided into three compartments, each about 16 ft. long inside. The centre compartment is intended for express matter. The two end compartments have large doors opening into the express compartment, but have no side doors. The end compartments are fitted up with ice-box and thick sides, etc., similar to those used on the Wilkes refrigerator car. The cars, 10 in number, have been built at the Susquehanna shops.

French Railroad Employes.

The following details as to the care of employés by the French railroads are substantially in accordance with the very full papers on the subject by M. Jacqmin, translated for the *Railroad Gazette* of 1872 and afterward republished in a pamphlet, which is now out of print. They will bear republication, and are taken from a descriptive paper on French railroads in the *Railway News* of London:

Employés pay only two cents per ton per mile for the transport of food and liquids intended for their own use on the roads employing them; hot drinks in winter and cooling drinks in summer are furnished at the company's expense; the railroads support supply stores furnishing employés with provisions, groceries, flour, wine and household utensils at merely nominal charges. In times of distress and dearness of living any employé whose pay does not exceed $360 per annum, in the neighborhood of Paris, or $300 in other sections, receives a monthly allowance over and above these sums according to the number in his family but not exceeding $3 per family. All classified employés, their wives and children supported by them are entitled, free of cost, to the advice and attendance of the company's doctor, medicine, surgical attendance and hospital treatment are included if the salary does not exceed $600 per annum. Free passes are granted to employés of every grade as a right; this privilege is equally accorded to the wives of employés, to the children for attending school, etc.; and more remarkable still, the father and mother, brothers and sisters, nephews, nieces, etc., of employés are entitled to half-fare tickets. Employés can also borrow money of the company without interest, to be repaid in installments monthly at the rate of one-tenth of their annual income. Praiseworthy acts of service are rewarded by gratuities, $155,000 having been so paid out in 1885.

East Indian Bridges and Engineering Work.

This year will be marked by engineers in India as the "great bridge year." Of the many important bridges now under construction and approaching completion the following are noteworthy as showing the magnitude of such work in India: a bridge over the Sutlej, on the Ferozepore Railroad, with 27 spans of 150 ft. each; one over the Jumna at Kalpee, on the Indian Midland Railroad, with 10 spans of 200 ft. each; one over the Jhelum, on the Sind-Sarya Railroad, with 17 spans of 250 ft. each; one over the Gunduck, to connect the Tirhoot system with the Bengal & Northwestern Railroad, with 8 spans of 250 ft. each; one over the Ganges at Benares, on the Oudh & Rohilkund Railroad, with 7 spans of 356 ft., and 9 spans of 115 ft. each; and another over the same river at Balawala, with 11 spans of 256 ft. each; another is that over the Indus at Sukkur now waiting the arrival of the iron-work for a span of 790 ft.

The chief towns in India are beginning to see the advantage of street railroads; the rails for the one at Lahore have arrived at Kurrachee, and the cars are being built by Robson & Co., of Lahore. There is a probability that petroleum will to a great extent supersede coal as fuel for engines, especially for locomotives, trains are now running on the Sukkur line hauled by engines using Beluchistan petroleum, and it is reported that the engineers find no difficulty with this fuel.

Railroad extension on the Madras side is going on well. It has been finally decided to commence a line from Arisakere to Hassan, and one from Oossoor, Salem district, to Bangalore. A line from Hydergbaut to Oompi, in Mangalor, is also to be surveyed at once.

There is a proposal that the Government of India should erect machinery for the local manufacture of large quantities of rails required for the many miles of railroad yet to be constructed in India.

RAILROAD GAZETTE

Published Every Friday,
At 73 Broadway, New York.

EDITORIAL ANNOUNCEMENTS.

Passes.—*All persons connected with this paper are forbidden to ask for passes under any circumstances, and we will be thankful to have any act of the kind reported to this office.*

Contributions.—*Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and in their management, particulars as to the business of railroads, and suggestions as to its improvement. Discussions of subjects pertaining to* ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

Advertisements.—*We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and those only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.*

THE ERIE REPORT.

The report of the New York, Lake Erie & Western which we published and commented on last week was that of President John King, which gave comparatively few figures, and referred for the data on which it was based to the reports of Vice-Presidents Felton and Donaldson, which appeared too late for our use last week.

The report of First Vice-President S. M. Felton, Jr., deserves special notice for its full explanations of those matters shown by the report which are likely to attract attention and inquiry, and especially of the details of working expenses. Rarely is a report published which enables the reader to see so well what the actual condition of the property is and what has been done to maintain or improve it. As we showed last week, this is especially important on a railroad like the Erie, whose property some years ago was in such condition as to make great changes in its maintenance expenses inevitable in the course of a few years, while the condition of its finances have made those changes even greater than they would have been naturally.

The fact in the report which most required explanation to those not intimately acquainted with the history of the property was the great increase in working expenses last year, amounting to $1,615,827, or 15 per cent., over those of 1884-85. It is true that there had been a phenomenal decrease in expenses from 1884 to 1885, amounting to $1,406,000; but that was known to be made under the pressure of necessity, and very few probably remembered that of this great decrease only $103,000 was in maintenance expenses. Last year the freight traffic was 22 per cent. greater, the passenger traffic 5¼ per cent. greater, and the train mileage 11 per cent. greater than in 1885, so that an increase in expenses was to be expected. Now examination shows that three-fourths of the whole actual increase was for maintenance of way and maintenance of cars, and that the expenditures under these heads last year were much larger than ever before. The expenses under the five general heads have been for eight years:

Year.	—Maintenance of— Way.	Cars.	Motive power.	Transportation.	General.
1878-79..	$2,158,931	$784,913	$3,213,384	$4,623,863	$393,607
1879-80..	1,938,715	861,135	3,291,141	5,109,980	442,953
1880-81..	2,098,906	1,056,805	3,782,861	5,851,335	466,373
1881-82..	1,995,368	1,009,662	3,639,506	5,832,979	610,579
1882-83..	2,308,315	1,143,882	3,848,099	5,736,817	541,586
1883-84..	1,938,974	900,157	3,325,302	5,234,741	650,164
1884-85..	1,732,062	1,023,556	2,959,393	4,437,808	510,749
1885-86..	2,409,751	1,556,050	2,954,291	4,899,994	459,320

The *average* expenditure for maintenance of way for the first five years, which were generally prosperous, was $2,100,407; but from 1883 to 1885 there was a great reduction, followed by the large increase last year. It is probable that in almost every one of these years until last year the expenditures under this head were less than the average requirements, first because the rails and ties were to such an extent new that few renewals were needed, and in 1884 and 1885, because money was not to be had. To a still greater extent was this the case with maintenance of cars. For the stock of freight cars was increased from about 17,500 in 1879 to 29,000 in 1882, and with so great a proportion of its cars entirely new, maintenance expenses must have been much below the average requirements for several years.

On the other hand, the expenditures for maintenance of locomotives may have been less last year than usual. They were not separated in the reports from the other motive power expenses, which include cost of fuel and wages of enginemen and firemen, until 1884, but for the last three years repairs and renewals of locomotives have cost:

1883-84.	1884-85.	1885-86.
$491,902	$517,022	$510,655

As there has been a very large reduction in the cost of coal since 1884 ($330,808, or 27 per cent.), we cannot be sure that there has been any decrease in the cost of maintenance of locomotives from previous years. In 1880, when the net earnings were the largest they ever had been, the expenditures for maintenance of locomotives were $582,158 as reported to the State Engineer. But whatever the fluctuations under this head, they do not make a large difference in the total expenses, they having been but 5 per cent. of them in 1880 and 4 2 per cent. last year.

It will be seen by the above table of the expenses divided under the five general heads that maintenance of way and of cars has cost, in thousands of dollars:

1879.	1880.	1881.	1882.	1883.	1884.	1885.	1886.
2,944	2,800	3,156	3,005	3,452	2,859	2,756	3,906

while all the other working expenses were:

1879	1880.	1881.	1882.	1883.	1884	1885.	1886.
8,230	8,844	10,100	10,083	10,126	9.210	7,908	8,313

Thus, while the expenditures under the two maintenance heads were much larger last year than ever before, the other expenses, which include little maintenance except $500,000 to $600,000 a year for locomotives, were much smaller than in any of the five years from 1880 to 1884, inclusive, and nearly as small as in 1879, though the passenger traffic has increased 23 per cent. and the freight traffic 31 per cent. meanwhile.

Now these facts are very important in any estimate of the value of the Erie property. The expenditures which have been reduced are for the most part those which do not affect the condition of the property, while those which have been increased are those due to maintaining or improving it. Very likely the maintenance expenses will not be hereafter as low as they were previous to the last year. The conditions which favored light maintenance expenses, at least as regards the stock of cars, no longer exist, for the great stock acquired in a few years after 1878 if not yet old certainly are middle-aged, and the average cost of maintaining and renewing them will increase, now that they are more liable to the ills that cars are heir to and have shorter "expectation" of life, as the insurance men say. The depreciation of their early years has to be made good in their later years, and this report shows to how great an extent this was done last year, and how, notwithstanding, the company was able to earn all its fixed charges, including the million of dollars of funded coupons.

Large as was the increase in maintenance expenses, the expense per ton mile was reduced from 0.475 to 0.448 cent, which places it among the lowest in the world. This was due chiefly to a further increase in the average freight train load, which has been, in tons, in successive years:

1878.	1879.	1880.	1881.	1882.	1883.	1884.	1885.	1886
159	185	210	218	228	227	239	252	279.

The earnings and expenses per freight train mile have been:

	1878.	1879.	1881.	1882.	1883.	1884.	1885.	1886.
Earnings..	$1.55	$1.44	$1.75	$1.71	$1.78	$1.72	$1.66	$1 84
Expenses..	1.07	1.04	1.15	1.20	1.21	1.24	1.20	1.25
Net earn..	0.48	0.40	0.60	0.51	0.57	0.48	0.46	0.59

Thus the large increase in average load has added very little to the cost per train mile. From 1878 to 1886 the increase in load was 120 tons (75 per cent.), and the increase in cost 18 cents, or 17 per cent. From 1881 to 1886 the increase in load was 28 per cent., in cost 9 per cent., or 61 tons were added to the average load at a cost of 10 cents. From 1884 to 1886 the load was increased 40 tons (16¾ per cent.), with an addition to the cost of 1 cent (0.8 per cent.); and the gain of 27 tons (11 per cent.), from 1885 to 1886, was accompanied by an increase of 5 cents (4 per cent.) in the cost, while the increase in maintenance of freight cars alone was 6¾ cents per freight train mile. As Mr. Felton says: "The prominent factors in these results [the increase in average train load] are the Consolidation engine, and a constant effort to load cars, as far as practicable, in both directions, and haul full trains up to the capacity of the locomotives." Too little credit is usually given to the last two of these factors, which have in many cases enabled managers, without any change in locomotives, to increase immensely the average train loads, in which cases we may say that the addition to the loads has been hauled by brain power.

No such increase in average passenger train loads has anywhere appeared, even where the passenger traffic has grown greatly, as it has on many roads since 1879. On the Erie the average passenger-train load has been:

1878.	1879.	1880.	1881.	1882.	1883.	1884.	1885.	1886
46	47	55	58	63	55	45	46	44

so that it has decreased rather than increased, though the passenger traffic grew rapidly up to 1882, having been in *millions* of passenger-miles:

1878.	1879.	1880.	1881.	1882.	1883.	1884.	1885.	1886.
140.3	149.1	180.5	200.5	225.1	200.4	169.6	173.9	183.2

The opening of the Lackawanna in 1883 almost alongside of the Erie for 200 miles must have had a considerable effect upon its local travel; and at all events the traffic which had increased 76 millions (50 per cent.) from 1879 to 1882, decreased 55 millions (24 per cent.) from 1882 to 1884, and the recovery of 14 millions (8 per cent.) since leaves it still much below that of 1881 and 1882. The cost per passenger train-mile has also been quite uniform, gross and net earnings and expenses per passenger train-mile having been:

	1878.	1879.	1881.	1882.	1883.	1884.	1885.	1886.
Earnings.	$1.19	$1.13	$1.32	$1.41	$1.30	$1.13	$0.97	$0.97
Expenses..	0.78	0.74	0.79	0.79	0.83	0.73	0.70	0.73
Net earn..	0.41	0.39	0.53	0.62	0.47	0.40	0.27	0.24

The profit has greatly diminished by reason of the reduction in gross earnings and in the average rates. The net earnings by passenger trains last year were only $996,934, while by freight trains they were $4,357,040.

The leased New York, Pennsylvania & Ohio Railroad last year had an increase of 5 per cent. in passenger traffic, 36¾ per cent. in coal and 14 per cent. in other freight, or an increase of 18¾ per cent. in all freight compared with 1885, which was carried with an increase of 12.2 per cent. in passenger-train mileage and 14¾ per cent. in freight-train mileage. The increase in earnings was 8 per cent. in passenger, 18 per cent. in coal and 31 per cent. in other freight, or 21¾ per cent. in all, while the total increase in working expenses was 11¼ per cent. and in net earnings 32¾ per cent. There was a small increase in the average freight train load, and a considerable decrease in the average passenger train load. The former is 188 tons, against 279 on the Erie. With this small train-load, however, the average expense per ton per mile was only 0.596 cent on the New York, Pennsylvania & Ohio, against 0.448 on the Erie, the cost per train-mile being only 74 cents. The increase in working expenses extended to all of the five general heads except general expenses, but was largest (38 per cent.) in maintenance of cars and (30 per cent.) in maintenance of locomotives. The net earnings of this road are kept down by the extremely low freight rate received, which was only 0.55 cent per ton-mile last year.

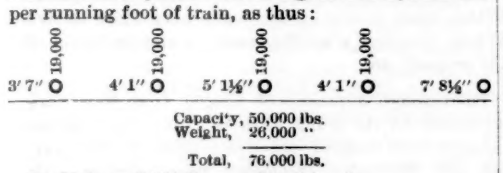
The improvement in the prospects of the Erie company within a little more than a year has been marvelous. The matured floating obligations which then were formidable in amount and very serious in effect have all been paid, and the company now pays its bills of all kinds promptly, and its employés in a few days after the close of each month. Its road and rolling stock meanwhile have been greatly improved and put in order to do a large traffic very cheaply. With rates fairly maintained, and especially with a small advance in the coal rates, which were unduly low last year (0.052 cent per ton mile *less* than in 1885, not more, as we said last week), and the continuance of the present condition of business, a very important increase of net earnings is certain.

TRUE ECONOMY IN BRIDGE BUILDING.

We present in another column two communications of unusual practical value, it is almost needless to say, on the question of the proper rolling load of bridges and on the degree of strength *in addition* to the known and certain requirements of every day service which it is expedient to give to bridges as a margin for future demands, or hidden deterioration, or flaws. As in every other communication, written or verbal, which we have had made to us—and they have been many, in addition to the six or eight which have appeared in our columns—the suggestions made in these columns are warmly approved of, that, *first*, a return should be made to a simple form of rolling load, instead of the present unmeaning and unwarranted complexity, and, *secondly*, that the assumed loading should be increased so as to give bridges some fair chance of long and safe life, as can be done at far smaller cost than bridge-buyers generally realize. One engineer, of long experience in practical bridge construction has done us the honor to write: "Your idea of a con

siderable increase in rolling load is a real stroke of genius. I don't know of any reform in engineering practice that would be attended with more valuable results." We claim no particular originality in the matter, however, except in first giving definite form and voice to the feeling which we knew to be floating through the minds of a great many. The most which we could claim, with any reason, would be to have put the facts as to the very slight effect of increased strength upon weight more clearly forward. Engineers who are engaged in a constant effort to make each successive structure as economical as its strain sheets permit, are rather discouraged than encouraged by their experience to take that view of the matter, and certainly they cannot be expected to undertake missionary labors.

New evidence that some changes of this kind in bridge-buying practice are imperatively needed very often comes to our notice. One of the latest is a fact which, we must confess, surprised us greatly, namely, that the uniform rolling load of 3,300 lbs. per foot, which we suggested as probably sufficient, *is already far exceeded by trains of cars alone.* The Baltimore & Ohio Railroad is now running trains of hopper coal cars of its new pattern which figure out **3,614** lbs. per running foot of train, as thus:



Capacity,	50,000 lbs.
Weight,	26,000 "
Total,	76,000 lbs.

On 21 ft. = 3,614 lbs. per ft. of track.

These hopper cars are the same as the old ones weighing, loaded, 60,000 lbs each, with the box made deeper. The old cars, with 15,000 lbs. on each pair of wheels, gave a distributed load of 2,850 lbs. per ft., or about the same as the Pennsylvania standard coal cars. Allowing for the usual over-loading of coal cars, trains of these cars may very easily run 3,700 or more pounds per foot.

These cars are now limited in width and height by the clearances of the structures on the road, and any further increase would require the road to be remodeled, so that it would seem as if they marked about the probable limit of car rolling load for that road, as well as for most others, for many years to come. But that the tendency on all roads is likely to be to approach this limit is evident from the fact that there is a great economy in shortening the cars as much as possible. The weight and cost of car needed for a given load is materially decreased, the side-track room needed is less, the work of the trainman is decreased, and power brakes will work better on it, and in other ways there is advantage. When, as is almost certain to be the case, freight cars are all equipped with good power brakes and automatic couplers and better trucks, so as to be run at higher speeds and carry heavier loads, the temptation to retain about the present length of car and increase the load *per foot* will be very great, because timbers over 30 ft. long are expensive, and it is of no importance in freight service, as it is in passenger service, to have a large floor surface if the cubic space be sufficient to carry the load.

The above given weight per foot exceeds considerably the weight per foot of the largest Consolidation engine, which is (*Railroad Gazette*, Sept. 17.)

For a "typical" Consolidation	3,276 lbs. per ft.
For an ordinary Consolidation	3,118 " " "

The excess is nearly one-sixth.

Now, who can say that in the exigencies of service a train of a dozen or twenty of these cars, which run by thousands over the Baltimore & Ohio, may not any day go over any bridge in this country, apart from the probability that the home road will soon approach them? It is not only possible but probable that it will happen, and in view of this fact we would again call the attention of railroad officers who are bridge-*buyers* to the fact that there is no such margin of safety as 2 or 3 or 5 or 6 in bridges as they now stand. Considering the static or "dead" loads alone, there is not much more than a factor of safety of 2; for the usually specified tensile limits of strain for bottom chords and main diagonals is 10,000 lbs., whereas the required elastic limit under quickly applied strains in single tests is only 26,000 lbs., which does not mean *more* than 20,000 lbs. actual elastic limit in the poorest piece of metal in the structure under long continued and repeated strains. But when we come to consider the unknown and unknowable increment in these static strains from vibration, from impact, from settlement, from bad joints, from counterweights, from gusts of wind, from flat wheels, from rocking in the springs, from varying length of parallel eye-bars or other members, from gradual wear, and other causes, nearly the whole of this nominal margin of 100 per cent. vanishes, so that there is not to-day more than 25 per cent. of absolute and certain margin of strength in most if not all American bridges. In proof of this: if there were in reality any such margin of safetyas 2 or 3, a loss of 25 per cent. of the metal in a bridge should not very seriously endanger its safety. It would only reduce the margin of safety from 2 to 1.5 or from 3 to 2.25, the lowest of which is ample *if it be a real margin.* But if it were possible to take away 25 per cent. of the strength of each member of any bridge uniformly, there is probably no structure in this country, or very few, which any competent bridge engineer would dare to risk in that condition for even 24 hours, and still less for a year or many years. The nominal margin of safety, therefore, which reads so prettily in the specifications, is a hollow humbug. Bridge engineers are now sailing as close to the wind as it is possible to do and leave any margin of safety at all, and bridge-buyers are allowing, nay, compelling them to do so, as a condition for following their calling.

The expert bridge-builders are certainly blameworthy in not moving more earnestly than they have or do to bring about the reform in this matter, which they could easily accomplish if they would only act unitedly, and which they could even make to their pecuniary advantage. But when a man is using a microscope he cannot well use a telescope, nor even his natural eye-sight, and the bridge engineer, whether a contracting engineer or not, is professionally called upon to go over his structures with a microscope to see where he can save material. The consequence is that the average iron bridge is not good for a life of more than 20 or 30 years, and that hundreds of them are being removed as too weak, as most of those now standing will be in time, not only from the increase of rolling load (which alone is certain to come), but from gradual deterioration and excessive wear due to too close approach to its limits of strength. The number of bridge accidents, it is true, is not large, but the number of structures which are looked at with suspicion by those responsible for them, and which are year by year removed as too weak, is very large, and even the break-downs make a formidable list.

It is not putting it a whit too strongly to say that the alleged strain-sheets which purport to give the strains of each member down to a small fraction of one per cent. are, owing to the neglected dynamic effects alone, the vaguest of vague approximations. What possible use is there, then, in trebling and quadrupling the work of computation simply to figure out strains to fit some one or two or three "imaginary locomotives with imaginary loads on imaginary wheels at imaginary distances apart," when there is not the shadow of certainty that the distribution represents the worst effect which will ever come even from the same load, and when there is a practical certainty that it does not represent the worst strains which will come even from cars alone?

In view of the details given in this article we must be pardoned for again referring to a letter which appeared in our issue of Oct. 8, from one of the ablest and most careful of our bridge engineers, Mr. G. Bouscaren. Mr. Bouscaren said:

"Your article of Sept. 17, on 'Good Practice in Bridge-Buying,' is in the right direction, but your fragmentary quotation of my remarks on Mr. Wilson's specification load imparts to them, I think, an unfair meaning. What I said was: 'The live load adopted by Mr. Wilson is not likely to be exceeded in the near future, although some roads are, I believe, using consolidation and passenger engines with respectively 26,000 lbs. and 45,000 lbs. on each pair of drivers,' and the fact remains that, although the engine weight specified by Mr. Wilson was below that *already in use at the time*, his live load, as a whole, which includes a uniform train load of 3,000 lbs. per lineal foot, has not yet been exceeded, even with the cars of 60,000 lbs. capacity now being used on the Pennsylvania road."

To this we replied:

"We quoted verbatim the clause, 'The live load adopted by Mr. Wilson is not likely to be exceeded in the near future,' and it certainly never occured to us that the closing clause which we did not quote was not intended to say in effect that 'although Mr. Wilson's engine loads are occasionally exceeded, yet they are not likely to be exceeeed enough to make the assumed loads too small for a specification.' *Moreover, we hardly think Mr. Bouscaren is correct in stating that 'the live load as a whole has not yet been exceeded.'* Two of the Pennsylvania Class R engines, followed by a train of the Pennsylvania standard hopper-bottomed gondola cars, will produce considerably greater strains in any span if less than 200 ft. or perhaps 300 ft. Such a train may never yet have been made up, *but it is liable to be any day.*

"Even if we neglect the engine load altogether, and consider the car load alone, *we suspect that strings of three or four cars could be found by no very long search on any of the larger lines which will approach, or even exceed, Mr. Wilson's limit.* In fact, 3,000 lbs. is closely approached in the above mentioned standard car of the Pennsylvania Railroad itself. * * It is only necessary to put another board on its side to increase its capacity to 60,000 lbs., which its wheels will perfectly well carry, or if a wrecked truck happens to be put on top of the car, or the end platforms are left off and its couplings shortened up a little, we have our limit at once. Already it is 2,620 lbs., per foot, and in practice probably 2,800 or more."

We ventured the italicized prediction simply on the general ground that it is very hard indeed to determine an absolute maximum of anything like the weight of cars, but we hardly expected to have our prediction so much more than fulfilled so soon. In view of it, the rolling loads which we proposed in a tentative way in our first article, 3,300 lbs. per foot and 30,000 lbs. concentrated load, seem already too small, and nothing LESS than 3,500 lbs. per foot and 40,000 or (far better) 50,000 lbs. concentrated load seems at all adequate to the requirements.

To this complection we must come at last—3,500 and 50,000 lbs.—if we would have decently durable bridges, and as bearing on the question of at what cost we can get them, and whether it will pay we may repeat from our issue of Oct. 1 the following:

Table showing the years which a Bridge must outlast to make the increase of cost in the first column a losing investment as respects saving the necessity of renewal, with cost of capital, etc.

Inc. per cent. in cost of bridge.	Inc. per cent. in weight of bridge.	Approximate corresponding inc. in permissible rolling load for span of		Interest at			
		50 ft.	200 ft.	4 per cent.	6 per cent.	8 per cent.	10 per cent.
		P. c.		Years.	Years.	Years.	Years.
1.0	2.0	8	3	117.4	79.0	59.8	48.3
2.0	4.0	16	6	48.1	47.2	46.3	45.4
4.0	8.0	¼	12	24.0	23.6	23.1	22.7
6.0	12.0	⅓	20	16.0	15.7	15.4	15.2
8.0	16.0	½	¼	12.0	11 8	11.6	11.4
10.0	20.0	.. ..	⅓	9.6	9 4	9.3	9.1
12.0	24.0	.. ..	½	8 0	7.9	7.7	7.6
15.0	30.0	....	⅝	6.4	6.3	6.2	6.1

Formula: $I\ (1+r)^n = 100.$

$$\text{Whence } \log n = \frac{\log \frac{100}{I}}{\log (1+r)} = \log \text{ of } \log \frac{100}{I} - \log (1+r).$$

In which I = increase per cent. in weight of bridge; r = rate of interest on capital, n = required number of years before the additional cost of the extra weight will amount to the cost of a new bridge (or 100), assuming weight and cost to be in direct ratio to each other.

Beyond this we need hardly do more than quote again, from the same article, the words of Mr. Jos. M. Wilson, late Engineer of Bridges and Buildings of the Pennsylvania Railroad, which puts in more pithy and simple words than ours the truths we are endeavoring to enforce, with the only fault that it does not state them as strongly as it might:

"The great point in favor of stone bridges, and really their saving clause, has been their great excess of strength. Those who favor stone bridges say: 'O, yes, they cost more money than iron bridges, but they are so much more permanent.' I say, put *the same* excess of material in your iron bridges, or rather *the same* excess of cost, and you will have a structure much better adapted to resist travel, time and the elements than you have in a stone bridge. I have never been in favor of stone bridges of any size for railroad traffic, particularly in our climate. The material, from its brittle, crumbling nature, is very ill adapted to resist the action of variable loads, impacts, etc., and where a frost can enter, it slowly but surely does its work."

Had Mr. Wilson said "I say, put *a mere fraction* of the excess of material, and *a still smaller fraction* of excess of cost in your iron bridges as in your stone" instead of stating "*the same* excess," he would then have fully put the case. Surely there is cause for reflection and reform in these facts.

THE EXPRESSION AND ARRANGEMENT OF TRAIN RULES.

It is generally acknowledged now, and was indeed foreseen by thoughtful men, that the Time Convention committee's protracted and painstaking labors in the direction of uniformity of train rules have, in spite of inevitable imperfections, resulted in a great and valuable work. It might be thought by the casual or careless observer that so simple and logical a compilation would be very easily put together; but railroaders need not to be reminded that a fair and pleasing exterior by no means implies a hollow or cheap substructure.

Complete uniformity is, of course, in some respects—perhaps, alas! in many—well nigh hopeless, at least for the present; but the point for present congratulation is, that in abandoning the attempt to reach the unattainable the committee has not dropped the whole subject in discouragement and disgust.

As the *Railroad Gazette* has pointed out, a great desideratum was, to have a form or skeleton of a code that could be widely adopted; or rather, that *would* be adopted by the large numbers of superintendents whose first feeling in regard to others' work is prejudice against it. In this, it is doubtless safe to say, the committee has been eminently successful, and it is now to be hoped that in the very near future a great many jumbled up time-tables will receive a straightening out that will astonish them and that will please as well as edify those who have to do with them. To have the general rules come first, where they ought to come; to have the signal rules by themselves, and *all* by themselves; to have local and temporary matters wholly weeded out and put where they belong, these and many other

features will prove to be a great advance, which can be fully appreciated only by new men and those who have the training of them. Many a superintendent—and good ones, too—will use this code and be thankful for it, who yet would never have had the courage to tackle, or the patience to finish, the reformation of his own code. And without doubt large numbers of those who object to certain rules, even perhaps the most important, still will adopt the form and follow the committee's style in getting up their regulations. This, we repeat, is a positive clearing of the atmosphere, and one step toward uniformity that is well worth while. But in the matter of *expression*—the way of telling a thing—there is still room for discussion, and, we think, improvement. Indeed, the committee, it seems from their remarks during the discussion on the adoption of the rules, distinctly intended to leave this point open for future action, either individual or concerted. They say their language is brought down to the comprehension of the lowest employé, but yet leave certain rules in wording that must be changed before inserting in a practical code; and even include some directions that are only for the division superintendents, or officers of that grade, which, of course, would not be put into the employés' book.

There *is* an advantage, when trying to make a man think of, or comprehend, a certain thing, in putting all other things for the moment out of sight; it *is* best in such cases to speak *to* a man instead of speaking *about* him; it *does* simplify the view and clear his vision to have him look directly at his preceptor and be told what *he* must do, instead of reading language addressed to nobody in particular, describing what *men* (of his class) *in general* should or must do; and nobody is warranted in ignoring these advantages because he thinks them small advantages. For these and other reasons the standard code ought, before being given to the conductors, station agents, etc., to be entirely re-written. Each individual should be able to find his orders without having to stop and cautiously consider at every sentence what portion of the rule is for himself and what portion is for some one else. It is simpler, for instance, to say, in the case of Rule 87, to one of the conductors, "When going east on single track *you* must keep out of the way of trains of the same class as yours which are going west; always having your train completely clear of the main track and the switch set right, before the opposing train is due to leave." (The word here italicized would of course appear in ordinary type.) The last half of the rule is a matter of discipline, and many would deem it superfluous. If left off, the comparison with the committee's way of putting it would appear more clearly. Of course *all* the conductor's rules which apply exclusively while running one way should be together and separate from those applying only to movements in the opposite direction.

Such a plan would of course involve a good deal of repetition, the same rule having to be addressed to several different classes, and perhaps in varied wording; but there can be no possible objection to this except the trifling one of the additional time and expense required in getting up the code; and it would save a large amount of repetition in the *reading* of the rules, or rather, in the thinking of those who read them. The present fashion is for the issuing officer to have all the advantages of brevity and conciseness, expressing his wishes (the rules) in the shortest possible form, and leaving the reader to interpret them. Why not reverse the plan; have all the calculating and differentiating done by the compiler, who has ample time to do it carefully, and endeavor to have each idea present itself to the conductor (for instance) in the most simple and direct manner possible? Certainly the trainmen, etc., deserve all the assistance possible in fixing the ideas in the memory. Why should not the compiler do what he can toward that end? There is a great deal of thinking and mental turning over and pondering of points that admit of slight doubt; and these very processes in the men's minds tend to breed doubtfulness: this is the kind of repetition that ought, so far as possible, to be obviated by *more* repetition through the printing press. There is no additional complication of thought, whichever way the matter stands; only, in the one way the digesting is largely done before hand, making assimilation easy, while in the other it has to be done at the time the rule is put in practice. In one case a single individual digests for hundreds or thousands, while in the other each one of the thousands has to laboriously do it himself.

The bell-cord signals (Rules 53–58) will perhaps illustrate one point suggestively. One way of arranging them is as the committee have placed them; another way would be to put 53, 55 and 57 together and then have 54, 56, 58 and 59 in a separate paragraph, thus having all the rules applying to a stationary train brought compactly together, and those applicable only to moving trains equally well arranged in another place. We will not say that this arrangement is better than the committee's; but there would certainly be those who would, in a discussion, prefer it. This shows that language may be easily comprehensible and yet be susceptible of improvement in its arrangement.

The general principles as to expression and arrangement here recommended were illustrated and explained at length in a series of articles, entitled "Train Rules," in these columns in May and June, 1883.

November Earnings.

The 41 railroads that have reported their earnings for November had in the aggregate:

	1886.	1885.	Increase.	P. c
Earnings	$17,820,591	$17,161,247	$659,344	3.8

This is a moderate increase, and it is an increase over a year when there was also on the average but a moderate increase over 1884, when earnings were very much less than in 1883. Our tables in previous years have shown:

		In total.	Per mile.
From 1882 to 1883	75 roads gained	6.3 p. c.	4.1 p. c.
" 1883 to 1884	79 " lost	8.9 "	12.5 "
" 1884 to 1885	91 " gained	5.8 "	2.6 "

We cannot compare fairly with these, because not half of the railroads have reported yet, and none of the great Eastern roads, which are likely to have gained more than Western roads. But we shall be able to trace the course of each of the several roads by the following table of their earnings in November for five successive years, in which they are arranged geographically, beginning northwest of St. Paul.

	1882.	1883.	1884.	1885.	1886.
St. P. & Duluth.	$128,959	$141,730	$149,320	$167,007	$149,501
North Pac	751,633	1,276,022	1,116,379	1,249,358	1,304,952
Manitoba	917,129	847,003	879,440	865,877	805,662
Mil., L. S. & W.	80,905	103,943	95,215	132,994	194,449
Ch., M. & St. P.	2,072,973	2,387,662	2,308,877	2,638,420	2,469,000
Chic. & N. W.	2,102,432	2,368,542	1,996,509	2,259,541	3,363,100
C., St. P., M. & O.	515,008	583,185	540,959	588,587	624,200
Burl., C. R. & N.	278,429	308,200	274,732	313,006	290,670
Cen. Iowa	109,014	157,678	122,196	123,716	132,450
Chic. & Alton	749,915	801,187	753,857	733,037	764,343
Chic. & E. Ill.	161,704	149,908	135,400	161,011	164,751
Ill. Cen.					
Ill. & S. Div.	1,101,929	1,119,610	1,099,074	1,043,976	1,022,715
Iowa lines	176,333	201,930	152,169	144,320	144,076
Ind., B. & W.	264,735	235,972	185,046	207,396	227,368
P., D. & E.	53,474	60,609	57,139	61,737	62,486
Ohio & Miss.	457,335	364,035	354,850	316,620	341,978
Wabash	1,525 715	1,560 120	1,125,438	1,153,000	1,088,000
St. L. & S. F.	333,026	395,462	396,957	466,824	462,961
Den. & R. G.	495,769	635,858	462,459	572 983	671,046
Ch. & W. Mich	131,559	121,914	107,722	116,881	132,257
Cin., L., St. L. & C.	223,303	211,264	196,313	194,678	206,447
Det., L. & N.	140,363	126,760	97,817	99,272	101,620
Clev., A. & Col	43,964	41,175	37,374	35,694	40,981
Ohio Southern	36 625	32,655	49,746	48,874	59,981
Cin., W. & B.	136,712	165,574	152,661	142,895	187,079
Buff., R & P.	31,338	82,885	104,501	117,543	125,327
Long Island	170 404	182,509	182,348	194,969	217,090
Norfolk & W.	261 235	271,379	244,810	247,623	322,659
Louis. & Nash.	1,200,902	1,307,394	1,199,596	1,129,894	1,285,990
Ft. Worth & D.	27,400	43,381	36,273	43,513	50,500

The roads northwest of St. Paul make a less favorable comparison with last year than in some previous months, the St. Paul & Duluth having a large decrease, while the Manitoba had smaller earnings than in any other of the five years, in spite of a considerable increase in mileage. Of the great roads northwest of Chicago, the Northwestern and the St. Paul & Omaha had a moderate gain and the Milwaukee & St. Paul a larger loss. But the Northwestern earned less than in 1883, while the Milwaukee & St. Paul earned more than in any other year except last year. The St. Paul & Omaha earned more than ever before. Further south the Chicago & Alton earned more than in any other year of the five except 1883, the Eastern Illinois more than in any previous year, the Illinois and Southern lines and also the Iowa lines of the Illinois Central less than in any other of the five years.

The Wabash had a small decrease, as did the St. Louis & San Francisco, but further west the Denver & Rio Grande had the great gain of 17 per cent., and earned more than ever before. The West Michigan also earned more than in any other year, and the Cincinnati, Washington & Baltimore, whose gain over last year was 30 per cent.

In the South the Norfolk & Western has the great gain of 30 per cent., and the Louisville & Nashville 14 per cent.

Judge Gresham's decision in the Wabash receivership case has attracted general attention and approval. Without having followed the case closely enough to know the merits in this particular instance, we can only say that in a very great many cases the practice of courts in appointing receivers and approving their action has always been utterly inexplicable to us. The persons appointed are very often representatives of one portion of the parties interested in the road, in many cases of the debtors rather than the creditors, and they have been permitted to manage the property for the benefit of that particular party, not infrequently directly against the interests of those whose claims were secured by first or other mortgage. To such an extent has this gone that there is little doubt that receiverships have been resorted to by managers for the purposes of permanently ridding a company in which they were large stockholders of part of a burden of interest which the road is able to earn, but the payment of which stands in the way of dividends. The bondholders, finding their interest withheld, sometimes for years, while net earnings are being applied to the payment of a floating debt or to improvements of the property, the whole of which goes to the benefit of the stock interest, finally accept a proposition for reducing their interest and funding their coupons. Meanwhile the business of the road under the receivership is often kept a close secret from the very persons, the creditors of the company, who have the best right to know, and for whose protection chiefly the receiver was ostensibly appointed. One thing should be insisted upon in every such case. The receiver should be a man with no interest opposed to any portion of the creditors, who will absolutely "hold the balance true," and he should frequently make full statements of the earnings of the road and his expenditures, in detail, so that every holder of one bond may know as well as any "insider" what the condition and prospects of the property are.

The through shipments of freight from New York westward by the trunk lines in November contrast strongly with those of previous months of this year, for the November shipments were phenomenally large, never before approached when there was any pretence of maintaining rates. Thus for eight successive years the New York shipments westward in November have been, in tons:

Year.	Tons.	Year.	Tons.
1879	91.593	1883	74,978
1880	82,002	1884	78,943
1881	114,592	1885	85,726
1882	79,599	1886	102,462

Thus the November shipments this year were 19 per cent. more than last year, 30 per cent. more than in 1884, and 37 per cent. more than in 1883, and were exceeded only in 1881, when there were immense iron imports, and rates were so low as to divert them and most other shipments from the canal to the railroads.

In every other month of this year except February the New York shipments were less than in the corresponding month of last year, and it seems astonishing that there should have been so great a change all at once. There were, it is true, special reasons why there should be a great falling off in shipments from October to November last year, as contracts at the old rates, only about one-half as high as the regular rates, were expiring, in spite of which we see that the November shipments were much larger than for three years previous; but this does not explain why the November shipments should have been larger than the October shipments this year, while in all previous years they have been very much less. Thus the shipmenis from New York in each of the five months ending with November have been:

Year.	July.	Aug.	Sept.	Oct.	Nov.	5 mos.
1886	86,738	100,741	108,416	95 649	102,462	494,006
1885	102,397	106,447	127,195	117 191	85,726	538,956
1884	92,222	101 040	106,819	92,254	78,943	471,278
1883	81,959	96,991	92,192	91,448	74,978	437,568
1882	79,464	115,862	115,056	118 840	79,599	508,821
1881	73,114	120,886	141,174	142,474	114,502	592,240
1880	78,193	92,042	99,460	86,858	82,002	438,575

This year the shipments were 6,813 tons (7 per cent.) more in November than in October, while in previous years they were *less* in November than in October by the following tons and percentages:

	1880.	1881.	1882.	1883.	1884.	1885.
Tons	4,856	27,882	39,241	16,470	13,311	31,465
Per cent.	5.6	19.5	33.0	18.0	14.4	26.8

Investigation into the quantities of different kinds of goods shipped during November enables us to say that there were extraordinarily large shipments of imported steel blooms, steel billets, spiegeleisen, etc., going to rolling mills or other iron works in the interior, as at Pittsburgh and Chicago. Such freight as this is likely to go by canal earlier in the season, but in November there were but a few days when the shipper could be sure that goods sent by canal could get through before the close of navigation, and it is possible also that the imports were unusually large then. Last year there were but very small imports of such materials nor have there been large imports before since 1882. They are a freight very heavy in proportion to value, and imports of 20,000 tons or so in a month would hardly be felt in the general movement of merchandise. It is not probable that the movement of other merchandise was much different in November from what it has been heretofore for several months.

The large gain over last year in November so far offsets the large losses in September and October that the aggregate shipments for the three fall months were only 23,585 tons (7 per cent.) less than last year, while the October shipments were 18 per cent. and the Sep-

tember shipments 15 per cent. less. The fall shipments this year, moreover, exceed those of any other year except last year and 1881, in both of which very low rates greatly increased business.

The meeting held on Tuesday of this week to organize a "New York Railway Club" will, it is to be hoped, result in accomplishing its end. The weather was unfavorable for a large attendance and many no doubt stayed away because only "organizing talk" was on the programme. The location of the rooms down town was likewise unfavorable, since the lower end of New York is practically deserted after business hours and is a long way from the homes of most of those likely to attend. Nevertheless, there was a very good and much interested attendance, and while permanent organization was wisely postponed to a later meeting, enough was said and done to make the outlook very promising.

The success of the similar organizations at Boston and Chicago certainly seems to indicate that there should be a field for a very active and useful club here, but there is this difficulty in the way; that—if Chicago will excuse us—New York is a so much larger place, and the large aggregate of men who would naturally be disposed to attend the meetings are so very much more scattered, and live, on an average, at so much greater a distance from any possible single place of meeting. Much the same law as the law of gravitation holds; it takes about four times as strong an attraction to induce a man to go twice as far to such a meeting. But there are enough railroad men in New York to make the meetings full and interesting after allowing for all possible losses from distance, if only there be some two or three men, as we think there will be, who will do the hard work of directing and keeping up interest in the meetings. The broader title will alone help the organization. The "Master Car-Builders' Club," which has been for some years an almost moribund organization, really invited to its meetings all classes of railroad men and discussed a broad range of subjects, but its narrower title kept many from acquiring an interest in it. Nor is it to be forgotten that the live railroad man in any department is interested in, and has more or less need to be posted on, all the others. Certainly this is the case with those who get along in the world, so that the interests even of master car-builders are better served by a more general organization, granting that it were possible to maintain the narrower one.

Chicago, Burlington & Quincy Earnings in October.

This report for October, like that of some other Chicago railroads, shows smaller gross earnings this year than last, but larger than in any previous year, as with the largely increased mileage they should be.

The mileage worked (approximate this year), gross and net earnings, and working expenses in October for seven successive years have been:

Year.	Miles.	Gross earnings.	Expenses.	Net earnings.
1880	2,712	$1,934,762	$780,560	$1,154,202
1881	3,168	2,031,001	898,277	1,132,724
1882	3,230	2,270,444	963,387	1,307,057
1883	3,264	2,742,480	1,115,246	1,627,234
1884	3,467	2,683,597	1,177,661	1,505,936
1885	3,620	2,858,257	1,190,647	1,667,610
1886	3,870	2,776,774	1,207,830	1,568,944

Though this year's gross earnings were exceeded only in last year, the net earnings were less than in 1883 as well as last year. Compared with last year there is:

A decrease of $81,484 = 2.8 per cent. in gross earnings.
An increase of 17,183 = 1.4 " " in expenses.
A decrease of 98,666 = 6.0 " " in net earnings.

This is the first month since May that there was not an increase in gross earnings over last year, and in July and August the increase was very large. Everything indicates that on this as on railroads further north there was an unusually early crop movement this year, which left less than the usual proportion to go forward in October, which is frequently the month of heaviest earnings, and was this year; but while the October earnings exceeded the September earnings by $218,223 last year, the excess in October was only $52,146 this year. Taking the whole period since June, during which the new crops have been affecting earnings, the comparison is very favorable, the gross earnings having been $10,580,118 this year, against $9,535,431 last year and $9,573,000 in 1884. Thus there has been an increase for the four months of $1,045,000, or nearly 11 per cent., and this indicates the existing conditions of traffic much better than a comparison for any single month.

The whole decrease in earnings was in freight earnings, and these fell off $120,264, or nearly 6 per cent., while passenger earnings increased $23,113, or 4 per cent., and other earnings increased $15,668, or 13¼ per cent. The fact that passenger earnings keep up indicates that the people on the line are not unprosperous.

For the ten months ending with October, the gross and net earnings and working expenses of this railroad have been:

Year.	Gross earnings.	Expenses.	Net earn.
1880	$17,064,615	$7,823,286	$9 241,329
1881	17,454,832	8,790,182	8,664,650
1882	17,324,323	9,033,129	8,291 184
1883	21,376,677	10,706,793	10,669,884
1884	21,189,422	10,967,383	10.222,039
1885	21,908,397	11,791,052	10,117,345
1886	22,103,637	11,399,018	10,704,619

Thus, both gross and net earnings were larger this year than ever before. Compared with last year the changes are:

An increase of..... $195,239, or 0.9 per cent., in gross earnings.
An increase of..... 392,034, or 3.3 " " in expenses.
An increase of..... 587,274, or 5.8 " " in net earnings.

The increase in net earnings over last year is quite satisfactory, but compared with previous years it is small when we consider the increase in mileage worked. The gain in gross earnings over last year was 7 per cent. in passenger and 5 per cent. in miscellaneous earnings, but there was a decrease of $174,103, or a little more than 1 per cent., in freight earnings.

Comparisons with English Railroad Statistics.

The extract which we publish from the as yet unpublished volume of discussions of railroad statistics by Mr. J. S. Jeans, the accomplished Secretary of the British Iron and Steel Association, is an excellent illustration of the difficulty of making bricks without straw. Mr. Jeans is a statistician of reputation and skill, and he has used the data of the International Railroad Statistics (for the leading railroad countries of the Continent of Europe), the Board of Trade reports and the company reports of the British railroads, and the Census and other statistics of our railroads in an effort to make useful comparisons illustrating the practice of the different countries, and the resulting economy. Throughout the chapter on "Locomotive Power" which we publish, the reader will see that he is balked in his efforts by the defects of the English statistics. The very first requisite for such a comparison is knowledge of *the amount of work done.* But what that is on English railroads no one knows. The reports show how many passengers and how many tons of goods were carried, but they do not show *how far* they were carried, and to compare the number of passengers carried per locomotive, say, over the Brooklyn Bridge Railroad, one mile long, with the number carried over a line like the New York Central, 440 miles long, or the Northern Pacific, 1,700 miles, is simply ridiculous. The comparisons of the annual mileage of locomotives in different countries is interesting, valuable and suggestive; the comparisons of earnings and cost per locomotive per year and per train mile are interesting, but they have next to no value unless we know how much the trains carried. The statistics of the most important Continental countries give this, and fruitful comparisons can be made between their railroads and ours; but the absence of these data for British railroads baffles us, and has baffled Mr. Jeans and every inquirer. Mr. Dorsey, in his paper before the American Society of Civil Engineers, attempted to overcome the obstacle by—guessing at the average English rates!—the most obscure of all the facts—and from the rates thus guessed at he deduced the other data of amount of work done, average train-load, etc., all of which is worth no more than his guess as to the average rates, about which the opinion of an English traffic manager who made the rates would be worth very little unless he had private returns of the passenger and ton-mileage.

If we had these latter data, very valuable comparisons might be made, though of course a passenger or ton-mile is itself but a rude unit of transportation work. We should doubtless find that we had larger average train loads than any other country, and that our locomotives were more constantly at work; but we should also find that in England a large part of the merchandise freight is carried with a promptness which approximates our express service by passenger trains, and which not only limits the load by the greater speed, but by the practice of giving a whole car for a small quantity of freight, while the very long hauls between great traffic centres in this country favor full train loads and a large daily average run by locomotives. Our service has been developed to suit our traffic and our circumstance much better than any other in the world, without any doubt; but we may not hastily conclude that the service of other countries is as unfavorable to them as it would be to us. In England it has been developed to suit very different circumstances, and in some respects certainly it is superior to ours, for those circumstances. It is quite possible, however, that England hereafter will put a higher value on cheapness of service than it has done heretofore, but which has been a condition of the existence of a very large part of our railroad system and of the country itself. The shaving off of a thousandth of a cent per ton per mile counts here where freight goes by rail in vast quantities 1,000, 1,500 and 2,000 miles; it is much less important where little freight goes more than 300 miles, as in England. But it is more important there now, when other countries compete with it more severely for the trade with foreign countries, than it was formerly, as is indicated by the recent public agitation on the subject of railroad rates, which previously received very little attention, though they were among the highest in the world for the shipments as to which rates were reported.

The Fall Cotton Movement.

The quantity of cotton marketed in the first three months of this crop year, Sept. 1 to Nov. 30, has been nearly 3 per cent. more than last year and 7 per cent. more than in 1884. The receipts at the seaboard and at interior Northern markets direct by rail and the Southern consumption have been:

	1884.	1885.	1886.
Bales	2,863,849	2,954,855	3,017,278
Thousands of lbs	1,387,019	1,447,393	1,486,100

The through movement by rail to the North, crossing the Ohio or Mississippi rivers, has been, in bales:

1884.	1885.	1886.
306,505	418,743	415,199

Thus this year it was a trifle less than last year, but 36 per cent. more than in 1884.

Compared with last year, the shipments *via* St. Louis were 15 per cent. less, *via* Cairo and the Illinois Central 20½ per cent. less, but by the Cairo & Vincennes 114 per cent. greater, making the total *via* Cairo considerably greater than last year. The Louisville, Cincinnati & Lexington brought to Cincinnati three times as much as last year, and the Cincinnati Southern nearly 30 per cent. more than then, while the receipts there by river fell from 18,262 to 451 bales. The amounts crossing at the different river towns were:

	1884.	1885.	1886.
St. Louis and above	108,890	178,182	149,875
Cairo	106,885	108,607	120,168
Evansville	14,075	18,496	23,803
Louisville	22,578	22,051	16,009
Cincinnati	35,502	57,251	67,189

The receipts at St. Louis and above are nearly all from Texas and Arkansas, which had very light crops two years ago. The above does not indicate the receipts at Louisville, but only the quantity crossing the river there. The chief part of the Louisville receipts crosses the river at Cincinnati.

While the total receipts at Southern seaports were slightly (26,000 bales = 1 per cent.) more this year than last, the New Orleans receipts were 53,638 bales (7 per cent.) less, and the Charleston receipts 50,940 bales (16⅔ per cent.) less. Savannah has gained nearly as much as Charleston has lost, and the four adjacent ports, Charleston, Port Royal, Savannah and Brunswick, received 784,232 bales this year, against 776,810 last. Norfolk and Wilmington gained largely. Galveston about 3 per cent. The total receipts of the Gulf ports, the South Atlantic and the North Atlantic ports were, in bales:

	1886.	1885.	Inc. or Dec.	P. c.
Gulf ports	1,210,403	1,254,519	— 44,116	3.5
South Atlantic	1,312,839	1,243,467	+ 69,372	5.6
North Atlantic	67,670	26,732	+ 40,938	153.2
Total	2,590,912	2,524,718	+ 66,194	2 6

The changes are not considerable, except in the receipts of the Northern ports, which are those direct by rail from the interior, as the cotton is credited to the port where it first reaches the sea. The receipts at New York and Boston by vessels from Southern ports are many times as great as those given above for North Atlantic ports. The large receipts reported for this year shows a much larger movement through by rail, which, however, is still not to be called large, averaging only 744 bales per day, or about 25 carloads.

About one half of the entire crop is usually marketed in these three months. The total was less this year than last in September and October, but in November it was 9 per cent. more than last year, 13½ per cent. more than in 1884, and 20 per cent. more than in 1883.

The receipts of the several markets, especially the interior markets, throw some light on the probable crop of the different parts of the country, compared with last year. There is a large increase in the receipts of Memphis and Little Rock, which indicates a larger crop in Arkansas, though only part of the Memphis recipts come from that state. Reports of the crop in Texas have been most conflicting. Receipts at Texas markets and at Shreveport, La., which receives chiefly from Texas, have been:

	1886.	1885.	Inc. or Dec.	P.c.
Galveston	425,116	413,406	+ 11,710	2.8
Houston	449,212	434,125	+ 15,087	3.5
Shreveport	42,564	40,960	+ 1,604	4.0
Dallas	14,071	17,632	— 3,561	20.2
Palestine	5,846	5,637	+ 209	3.7
Brenham	11,590	17,250	— 5,660	32.8
Total	948,399	929,010	+ 19,389	2.1

Doubtless a large part, and perhaps the largest part, of Galveston receipts, were first received in one of the interior markets, and the total is not to be taken as indicating the *quantity* of cotton marketed in Texas; but the comparison with last year is the important thing, and that shows a small gain in the aggregate, and decreases at only two places, Brenham and Dallas. Direct shipments are made to St. Louis and to New Orleans from Texas, and the receipts at both these places have decreased; but they have so great receipts from other states that we may not conclude that the decrease has been in receipts from Texas.

Straps and Stupidity.

It seems that certain people in England are just finding out things which the enlightened American has known from away back, if we may judge from a long article in the last *Railway Engineer* on the "Carrying Capacity of Railway Carriages and Tramway Cars," which describes an amusing attempt to solve in some new and strange way a problem as to which the American people sounded all the depths of knowledge long ago—how best to pack people away like sardines who are in "transit only 30 minutes." Of course there can be but one rational answer to that problem, STRAPS and plenty of them. But the biased editor of the journal referred to does not see it in that light. On the contrary, he advocates in a six-page article a new-fangled English device, which proposes that:

"In altering and adapting carriages to accord with the invention, the seats now used must be entirely removed *and no provision whatever made for seats*, but BARS alone will be fitted in the carriages and remain there permanently.

"In this way the whole of the floor of the carriage is utilized for carrying passengers to an extent of from 100 to 200 per cent. in excess of the number carried in carriages as at present constructed with immovable seats and without the bars.

"Instead of constructing a carriage in compartments varying from three to eight in number as now formed, it may be constructed in saloon form, and instead of carrying 80 passengers in eight compartments, it would, in saloon form, without the dividing partitioning, be competent to carry conveniently and easily at least 200."

The bars are thus described:

"Perpendicular bars of a suitable thickness and strength are placed, three or more of them, as convenience may dictate, from the floor to the roof at certain distances apart from each other. * * * *The bars are for the use of passengers to grasp and hold, so as to steady themselves and*

preserve their equilibrium during transit, while the train is in motion."

"The hook on the back of the knapsack," wrote the ever to be lamented John Phœnix (Lieutenant Derby, U. S. A.), at the very end of an otherwise grave report which it will be remembered—or probably at this late date it may not be remembered, but he did submit a formal report on an "improved knapsack" to Mr. Jefferson Davis, when Secretary of War, which ended with these words: "The hook on the back of the knapsack, the purpose of which may not be immediately clear, is to be used for hanging on any prisoners whom we may take while on the march and bringing them into camp." We recall nothing later than this now historical anecdote quite equal in bland coolness to the closing italicized paragraph.

Lieutenant Derby's humor, however, did not carry him to the sublime height of claiming that his proposed arrangement was designed for the greater comfort of his prisoners, as does our editor's, in the following choice paragraphs:

"Why should people always, upon entering a railway carriage, for however short a journey, at once resolve to be seated? *Is it not because there is no convenience for standing?* To not an inconsiderable number of people, riding in a railway carriage in a standing posture would be an acceptable relief. Take, for instance, the multitude of people who pursue a sedentary daily occupation which necessitates sitting the whole time while so engaged. To these the change of posture would be grateful and healthful in their short journeys to and from their varied avocations. And it is probable that the short-distance passenger whose daily pursuit requires some physical activity would not be disinclined to stand in a carriage possessed of the improvements.

"The question is not to be decided upon the mere demand of the public for luxury. It does not wholly rest with them, *nor is it primarily for their consideration.* The companies are paramountly entitled to a reasonable profit upon their capital, and may work their traffic upon such terms as may conduce to that end, although the *technical comfort* ["technical comfort" is good] afforded to the public may be somewhat diminished."

Our editor then proceeds to argue from experience that people can just as well be made to stand, and really prefer it, as eels do being skinned alive, as follows:

"In Germany, as in some parts of the United Kingdom, it is an established system for railway travelers to travel in carriages in a standing posture; and we are told that in the United Kingdom it was quite general when railways were first introduced. In 1840, when the London & Blackwall Railway was opened, the *second* class carriages had no seats. At the time the Manchester & Leeds line was opened, the company, it was stated (in the *Parliamentary Gazette*) 'provided for the convenience of the working classes open wagons without seats.' In the same work it is also stated that 'open carriages in which the third-class passengers stand are frequent used for short journeys on lines of great length.' *There does not appear to be any good reason why this system should not be revived, or rather extended,* if it can be shown that both the companies and the public would reap material benefit from it when associated with the uses of this invention. Half the traffic on the Thames, the Mersey, the Tyne, the Clyde, the Scottish Lochs, and other navigable waters, consists of passengers who do not sit at all during the passage, because more sitting accommodation has never been demanded, or expected, or afforded; or because, from choice, they do not need it. Ever since the institution of steamboats for local traffic (inaugurated on the Clyde in 1812) the same state of things has prevailed down to the present day—the people demanding no change nor raising clamor for increased seat accommodation."

Why we are not likewise regaled with a few facts from American experience "in the same connection" passes our comprehension. Probably because the editor did not know we had any, as indeed would seem to have been the case at the British patent office (where novelty is now supposed to be required), or no plan for packing people away like sardines could have been patented because of so trifling a variation as the use of bars instead of straps; but perhaps our editor simply wished to reserve his strength and space for the following arguments, by which the proposed arrangement is further defended with unique eloquence and force:

"*The most obvious, facile and practical way to obviate the complaints and difficulties occasioned by overcrowding,* and at the same time to increase the companies' income and diminish their working expenses, *is to make the present service of carriages and trains* adequately respond to the overwhelming demand upon the companies' carrying resources by so arranging the interior of the carriage, as defined by the invention, that it may *carry a largely increased number of passengers.* The receipts will be augmented, and there will be a proportionate saving of wear and tear of railway stock *through running the carriages filled with from* 100 *to* 200 *per cent. more passengers than carriages of the present construction* ARE DESIGNED *to carry.*"

A more delightful touch of unconscious humor than lies concealed in the above italicized words, and only comes out clearly when they are read in due sequence to each other, without obstruction from the extraneous words in Roman type, the whole world may be challenged to produce. The closing sentence of the article, however, is "alas, too troo," as Artemus Ward was fond of remarking. We know it to be so:

"The invention, although possessing an infinitely larger range of application to railways, is also well adapted to steam tramways, for the cars are capable of the same utilization of space and convertibility as railway carriages."

But one emendation of this paragraph seems desirable—to strike out the word "steam" and add the words "m ore so.

In spite of the terrible storms in November lake shipments of grain continued about as large as usual down to the close of navigation, having been in successive weeks of November, in bushels:

Week to	1882.	1883.	1884.	1885.	1886.
Nov. 6	2,023,534	2,691,587	2,111,786	1,854,737	1,816,181
Nov. 13	1,629,282	1,674,227	1,954,900	1,765,619	1,838,104
Nov. 20	1,639,693	2,410,087	1,562,703	1,388,854	2,100,051
Nov. 27	1,033,322	1,339,185	1,495,216	695,901	1,868,682
4 weeks	6,355,831	8,115,086	7,124,605	5,703,111	7,713,018

So that the lake shipments in November and especially in the last week have been larger this year than in any of the three years previous. At the same time the rail shipments of grain were unusually small—even a little less than last year. This is probably largely due to the fact that the shipments this year to an unprecedented extent came from Lake Superior ports, which do not ship any grain by rail.

New York is less inclined than most other places to take dressed beef from the West in place of cattle, and though there has been a considerable increase in its takings of dressed beef this year, yet by far the larger part of its supply still arrives on the hoof. Thus the average monthly receipts in 1885 and for 10⅔ months of 1886 were, in tons:

	1886.	1885.	Inc. or Dec.	P. c.
Cattle	23,272	28,202	— 4,930	17.5
Beef	13,265	16,075	— 2,810	17.5
Dressed beef	5,796	4,422	+ 1,374	31.1
Total beef	19,061	20,497	— 1,436	7.0
P. c. dressed	30.4	21.6	+ 8.8	41.0

The decrease in the total is doubtless due to a falling off in the exports, which affects the live cattle receipts exclusively; for though a great many carcasses are exported, substantially all the slaughtering is done in New York. This alone would reduce the proportion of live cattle received; but there has been an absolute increase of 31 per cent. in the average monthly dressed beef receipts, and the proportion of the total supply arriving dressed has increased from 21½ to 30½ per cent. But though there is a gain over last year, not much progress has been made this year, and the proportion of the total supply arriving dressed was about as great in June as in November.

As the new corn gets into condition to be marketed, receipts of corn fall off. Usually very little new corn goes forward till December, but owing to dry weather it was fit to ship unusually early this year, and some was received in Chicago more than a month ago. But whether fit to ship or not, the new corn has just about the same effect on shipments when there is the usual surplus of old corn on hand, as there must be now. This surplus in farmers' hands is always much greater than the whole quantity sent to market, and if the new crop is abundant the old goes forward rapidly in the fall. It has not gone forward rapidly this year, however, the average weekly receipts of corn at the Northwestern markets in September and October, and the actual receipts in each of the four weeks since October having been, for four years:

	1883.	1884.	1885.	1886.
September	3,040,849	2,135,178	2,094,940	2,138,922
October	1,869,705	1,079,714	1,703,918	1,922,576
Week to—				
Nov. 6	1,572,989	1,064,784	1,035,539	1,596,457
" 13	1,875,386	1,149,062	926,505	1,313,433
" 20	2,154,882	1,768,834	1,642,768	1,439,401
" 27	1,580,819	2,137,737	2,375,916	941,078
November	7,184,076	6,120,417	5,980,728	5,260,369

Taking September and October together, the receipts were a little greater this year than last, and a fourth more than the year before, but a great deal less than in 1883. In November, however, when the new crop should have most effect, the shipments were less this year than in any other of the four. It is to be said, however, that last year, when the crop was known to be very large, the receipts were less in November than after the smaller crops of 1883 and 1884.

The winter packing season opened badly, owing to the Chicago strike. The number of hogs packed Nov. 1 to 17 is reported at the leading packing towns to have been 557,400 this year, against 853,069 last year, a decrease of 295,669, or 35 per cent. At Chicago the decrease was from 440,000 last year to 165,000 this, or 275,000. Thus the stopping of work there does not seem to have increased the packing at other places, they having packed 392,400 this year, against 413,069 last. It is quite probable, however, that if there had been no strike, fewer would have been packed at Chicago this year than last, and the decrease at other places would have been greater than it actually was. There was an increase at Kansas City and Cedar Rapids, but a large decrease at many places not affected by the strike, as at St. Louis and Indianapolis (33⅓ per cent. each), and at Cincinnati (20 per cent.) The time covered is too short to serve as any indication what the packing for the whole season will be, the weather and other considerations often having a great effect on the winter packing.

Since the days when steamers first began to ply the Mississippi, the fickleness of this river has been proverbial, and the only ground for surprise is that more boats are not stranded on newly formed sand bars rather than that so many are. As one illustration of the fickleness of the stream: Less than a year ago, when the transfer inclines for the "Queen & Crescent" route were being built at Vicksburg and Delta, a steam excavator had to be used at one point to get the proper grade. By a sudden freak the current changed, and where the river bed was then level with the bottom of the caps of incline it is now scoured out to a depth of over 50 ft. Several hundred feet of incline were washed away, but the damage was soon repaired.

During the past two years the New York, Lake Erie & Western Company has made very great improvements in its suburban service. Both on the main line and on the branches near New York the train service has been largely increased, and there has been a marked improvement in the rolling stock in use, in the running of trains and in the ferry, and to these may be added the building of the new station in Jersey City, now nearly completed. The Erie has on its lines an excellent country for suburban settlement, better in some respects than can be found on any other of the lines from New York into New Jersey, but until recently its suburban train service has been so far inferior to that of the New Jersey Central, the Pennsylvania, or the Delaware, Lackawanna & Western, that the increase of this business was not as rapid as on the other lines. The improvements made in the last two years, however, have gone far toward putting it on an equality with its competitors, and the effects are already visible in a rapid growth of the suburban towns and villages along the road.

Most of the more important Massachusetts railroads have now made their reports to the Railroad Commissioners for the year to Sept. 30 last, and in every case their earnings were larger than the year before, and in many cases much larger. The very large gains are chiefly by lines which have a considerable through traffic, and doubtless are to some extent due to the higher rates on that traffic, but this traffic is not a sufficient proportion of the whole to account for the larger part of the gains in earnings, except in one or two cases. For instance, it is probable that the gain of 10 per cent. by the New York, New Haven & Hartford was due much more to local than to through traffic, and probably also the gain of 18½ per cent. by the New York & New England The Fitchburg's through business is a larger proportion of its total business, and it gained 17 per cent., while the Boston & Lowell gained 13⅔ per cent., and the Boston & Albany 10¾. Most of the railroads earned less in 1885 than in 1884, but the recovery last year was sufficient to make the earnings not only larger than in 1885, but also larger than in 1884.

The effort which it is announced the Wisconsin Central is making—to abolish the practice of paying fees to sleeping car porters and waiters—will have the good wishes of every one, but whether it is destined to any large amount of immediate success we cannot but doubt. We have heard that a very determined effort of the kind was once made by the Pullman Company. The wages of the porters were raised to about "three times their former amount," as it is announced has been done on the Wisconsin Central, stringent orders against the acceptance of fees were issued, and (we have been told) enforced for a time by numerous discharges, but the effort was finally abandoned as impracticable.

The difficulty is that a great many people like the fee system, or find it convenient. They are quite willing to pay a little extra sum for the sake of having during their trip an obedient servant to fetch and carry for them, deliver telegrams, bring in lunches, and otherwise look after their comfort. In very many cases they fail to get any large amount of either civility or attention for their money, but when one man is ready to pay money and another to receive it, it is pretty hard effectually to forbid the transaction, nor is there any magic in an increase of pay, however large, to make a porter less willing or anxious to pick up a dollar or two a day more if he can, while there is a considerable chance that his greater independence of the passengers will make him more surly and disobliging, both to those who pay fees and to those who do not. Moreover, the giving of fees has become a habit among a large class of travelers, many of whom will not know or care what the Wisconsin Central rules are, when they ride on its cars, and will tender their quarters as they have been accustomed to do.

Eventually the fee system will no doubt pass away with other relics of barbarism. Its total disappearance among large classes of men in this country, as for instance policemen and all regular train and station employés, who are given to the most bare-faced and shameless seeking of fees abroad, seems to indicate this strongly; but among those who render what may be called personal service, like porters and waiters, it is as yet rather increasing than decreasing in this country. Perhaps the Wisconsin Central is starting a movement which will be the beginning of the end, but we fear that it will at least take constant and determined vigilance to insure its success.

Several master car-builders have been for the last five years in the habit of holding periodical meetings at the Tifft House, Buffalo, N. Y., for the purpose of discussing the rules of interchange and other matters of interest to car-builders. These meetings have been hitherto informal, but it has been now resolved to form a "Central Railroad Club," meeting either at Buffalo or Detroit, and continue these discussions on a more formal and extended basis. At a recent meeting held at Detroit, a committee on organization was appointed to draw up rules and constitution for the new body, and will present a report at a meeting of those interested, to be held at Detroit, Jan. 26, 1887.

The officers of these central roads are, of course, deeply interested in the rules of interchange, as they have to deal with so large a number of cars belonging to other roads, and as a system of joint inspectorship has been already adopted at Black Rock, with very satisfactory results, it is to be hoped that the new body, the Central Railroad Club, will be able to do some good work in facilitating the movement of cars as far as they are affected by the rules of interchange. Other matters interesting to car-builders and master mechanics will also doubtless be discussed at these meetings.

At a recent meeting of the New England Railroad Club, one of the speakers made a remarkable statement during a discussion on the Rules of Interchange. This statement,* based on an experience gained in handling a large number of cars, some 2,000 per day, amounted to saying that the average freight car required some repair every 1,200 miles run, or that of a large number of cars leaving an Atlantic port for Chicago, every car would require some repair before reaching its destination. This is certainly "important if true." Probably most of the repairs are of a trival nature, but even with all due allowance, it does seem as if the average freight car is allowed to run in somewhat bad condition, and that many of the parts must be ill-adapted for their service. The enormous number of small repairs which the figures imply, will astonish those who have not been concerned in the practical working of the interchange question, and form

*See Mr. Doran's speech as reported in *Railroad Gazette*, Nov. 19, 1886.

a strong argument in favor of heavier, stronger and more durable forms of car construction.

The system of joint inspectorship established at Black Rock, near Buffalo, where several of the roads interchanging traffic there have for some time maintained joint inspectors, has worked very satisfactorily, and is found a great improvement on the old plan of each road having its own inspector. This results generally in numerous disputes and much correspondence over little details, which, occurring as they do by the thousand, creates a great deal of clerical and other work.

We also understand that the system of joint inspectorship has diminished the number of repairs found to be necessary at the interchange point. During the three months ending January, 1886, no less than 23 per cent. of the cars interchanged at Buffalo and Black Rock, etc., had to undergo some repair, all cases, even to supplying a nut, being reckoned. During the three months ending July, 1886, the number was reduced to 17 per cent., a very considerable reduction in the short time.

These figures, it may be noted, while they do not suffice to positively disprove the large-sized statement quoted above, certainly do not indicate that all the cars, nor half the cars, require repairs in a run of 1,200 miles.

Record of New Railroad Construction.

Information of the laying of track on new railroad lines is given in the current number of the *Railroad Gazette* as follows:

Chicago & Indiana Coal.—Extended from Fair Oaks, Ind., northward 7 miles.

Chicago, Milwaukee & St. Paul.—Track on the *Kansas City Extension* is laid for thirty miles southwest from Ottumwa, Ia., an extension of 10 miles.

Chicago & Northwestern.—The *Dakota Central* line is extended from Doland, Dak., to Verdon, 24½ miles.

Chicago, Rock Island & Pacific.—This company's *Chicago, Kansas & Nebraska* line is extended westward 11 miles.

Colorado Midland.—The first track is laid, from Colorado Springs, Col., west 3 miles.

Covington & Macon.—Track laid to a point thirty miles northward from Macon, Ga., an extension of 17 miles.

Fremont, Elkhorn & Missouri Valley.—The *Scribner Branch* is extended west to Lindsay, Neb., 46 miles.

Kansas, Nebraska & Dakota.—Extended from Waverly, Kan., northwest to Topeka, 56⅓ miles.

Minneapolis & Pacific.—Additions of 37 miles at various points are reported.

Northern Pacific.—The *Cascade Division* is extended from Cle-elum, Wash. Ter., west 5 miles, and from Payallup Junction, Wash. Ter., east 51 miles. The *Duluth & Manitoba Branch* is extended north to Red Lake Falls, Minn., 50 miles.

Ohio River.—Extended northward to a point eight miles from Parkersburg, W. Va., an extension of 32 miles.

Piedmont & Cumberland.—Track laid from Piedmont, Md., to Keyser, W. Va., 5 miles; also 7 miles east of Keyser.

Prescott & Arizona Central.—Extended south to Prescott, Ariz., 22 miles.

Sanford & Indian River.—Extended from Oviedo, Fla., to Lake Charm, 1 mile.

Silver Springs, Ocala & Gulf.—Extended from Cotton Plant, Fla., south to Leroy, 4 miles.

Summerville & St. John.—Track laid from Summerville, S. C., south 8 miles.

Syracuse & Baldwinsville.—Track laid from Syracuse, N. Y., to Baldwinsville, 12 miles.

Texas, Santa Fe & Northern.—Track laid from Santa Fe, N. M., north to Española, 38 miles.

Wilmington, Chadbourne & Conwayboro.—Extended from Mt. Tabor south to Loris, S. C., 6¼ miles.

Wrightsville & Tennille.—Extended from Benton, Ga., south to Dublin, 7¼ miles.

This is a total of 461 miles on 21 lines, making 6,572 miles reported so far this year. The new track reported to the corresponding date for 15 years has been:

	Miles.		Miles.		Miles
1886	6,572	1881	7,601	1876	2,283
1885	2,639	1880	5,836	1875	1,264
1884	3,626	1879	3,594	1874	1,808
1883	5,946	1878	2,243	1873	3,606
1882	9,648	1877	1,994	1872	7,065

This statement covers *main track only*, second or other additional tracks and sidings not being counted.

Shifting Cars at Harrisburg.

Many an "old stager" in railroading, now sitting in the superintendent's chair, or higher, can remember the time when, as yardmaster, he changed his motive power from horses to iron horses, and how, in spite of the great advantages resulting, he still had a few disadvantages to mourn over. In these days of numerous and omnipresent "switchers" there are many yard men of the younger generation who would scarcely believe that horses could be of service in a freight yard; but in the primitive times they were employed, as they are still, and very extensively, in England and on the Continent, and they had some peculiar advantages. One of these was the fact that they could be hitched to the side of a train, and could thus "kick off" cars from the rear without going to the front end and pushing the whole train every time a single car was to be thrown back; and could "fly" cars from the front end into a side track without making any flying switch at all (as an engine would have to do); in short, they could be changed from the front end to the rear and from one track to a parallel one along side; could go first to one end and then to another without using a single switch or wasting a single step. By a very simple arrangement the Pennsylvania Railroad, in its large distributing yard at Harrisburg, secures most or all of these advantages without the disadvantages. What horses used to do with eight-ton cars, containing ten tons or less of freight, is here done with twelve-ton cars piled up with 25 or more tons of coal or other merchandise apiece, by the aid of locomotive power.

This is accomplished by having the switch engine work on a parallel track to the cars to be switched, and not on the same track. On each rear corner of the tender and on each front corner of the locomotive is a pole or push-bar, suspended from a short standard, so as to be readily controllable by one man, or to be readily stowed away on rests when out of use, in a manner difficult to explain without an engraving, which we are not able to give in this issue.

Trains of sixty and seventy cars, weighing in the aggregate from 1,000 to 2,500 tons, impose many new problems in train-handling, not the least of which are economy of time and safety to draw-gear in putting together the train at its starting point and distributing it at the terminus. This problem has been met and very satisfactorily settled by the method in use at Harrisburg, which, begun several years ago when Mr. James McCrea was Superintendent of the Middle Division, has been brought to a high state of perfection.

Trains arriving from the West, requiring to be separated into from twenty to sixty different parts for distribution to the proper tracks, are stopped at the entrance to the yards and the engine detached. The switching engine stands on a contiguous parallel track near the front of the train, and is accompanied by a crew of eight or ten men (sometimes more) whose conductor has already in his hand a list showing the destination of every car in the train. This list comes from the train conductor by telegraph an hour or more before the arrival of the train, and is copied in manifold so that the switch-tenders can have copies. This supplying switch-tenders with written instructions is no more than many conductors do, and have done for years; but in a yard handling 2,000 to 4,000 cars per day it becomes quite necessary to have the list telegraphed ahead so as to admit of modifications in the distribution. For instance, if there should be a rush of New York freight, the New York track might be overcrowded and necessitate the use of some other track; and the instructions concerning such changes can, by the aid of the telegraph, be given to the switchmen in ample season, and confusion avoided. The east-bound yard at Harrisburg has some 25 or 30 tracks, and at present three switch-tenders are required in distributing a train into the 15 or 20 tracks which almost any one train is likely to require for its proper sorting, so that four copies of the list are manifolded by the operator. Extensive improvements already begun, which include a new passenger station and train shed, and separate tracks through the city for passenger trains, will eventually still further simplify the work. Superintendent McClellan contemplates, we believe, the introduction of a tower, and changes in the tracks which will dispense with two of the three switch-tenders. With tracks arranged as in the West Shore freight yard at Buffalo, or like the Union yard at Denver, and levers concentrated in a properly located tower, without any, or without much, interlocking, one man could doubtless handle the switches for distributing to a very large number of tracks.

The telegraphic report is in this form:

PENNSYLVANIA RAILROAD COMPANY.

CONDUCTOR'S REPORT OF SHIFTING TO BE DONE AT HARRISBURG.

Train 218, *Engine No.* 766.

	A.		B.		C.
1st Cut	2	Cars, at Car No.	2833	For Siding No.	3
2d "	2	" "	400	" "	8
3d "	8	" "	15966	" "	5
4th "	5	" "	4801	" "	15
5th "	8	" "	23461	" "	21
6th "	3	" "	18053	" "	6
7th "	4	" "	30178	" "	3
8th "	1	" "	294	" "	4
9th "	1	" "	6548	" "	10
D. 10th "	1	" "	9300	" "	9
F. 11th "	2	" "	666	" "	11
G. 12th "	4	" "	13491	" "	7
H. 13th "	1	" "	2740	" "	8
J. 14th "	2	" "	9489	" "	3
K. 15th "	6	" "	87	" "	5
M. 16th "	3	" "	550	" "	15
N 17th "	2	" "	3295	" "	20
P. 18th "	10	" "	28410	" "	19
Q. 19th "	1	" "	701	" "	7
R. 20th "	2	" "	8843	" "	9
S. 21st "	1	" "	7296	" "	16
U. 22d "	1	" "	17405	" "	6
V. 23d "					
W. 24th "					
X. 25th "					
Y. 26th "					
Z 27th "					
AB. 28th "					
AC. 29th "					
AD. 30th "					
AE. 31st "					
AG. 32d "					
AH. 33d "					
AJ. 34th "					
AK 35th "					

ANDERSON, Conductor.

This shows a train of 70 cars, to be placed upon 14 different tracks; and it must be cut in 22 places, because seven of the tracks are to receive cars from different parts of the train. In telegraphing, the operator sends, say for the 17th cut, "N A 2 B 3295 C 20." This abbreviates the report materially, and, in practice, operators familiar with each other can still further shorten the time required by omitting the letters and sending a whole column of figures consecutively. It will be seen that the cipher is the work of a practical telegrapher, being in marked contrast to the productions of some kid-glove officers, who will fill up a cipher with such letters as L, O, T, etc., to the endless annoyance of operators. For the 17th cut the "pin-puller" cuts off *behind* car 3,295, and the switchman, as soon as he sees that car pass him, sets the switch for track No. 19 as required by the list for the next "draft" or "string" of cars.

This list (shown here condensed in size) is about 7 by 8½ in., and has upon its back printed instructions, for the uniform guidance of the conductors in preparing the lists for the operators, as below:

EXPLANATIONS.

Siding No. 1—Loaded Shop Cars.
" 2—Lebanon Valley Cars.
" 3— " " "
" 4—Co. Coal Cars.
" 5—C. & P. D. Cars.
" 6—Harrisburg.
" 7—Steelton.
" 8—Columbia Local.
" 9—Through Local.
" 10—Conewago Cars.
" 11—Through Local.
" 12—N. Y. Stock.
" 13—Philada. Stock.
" 14—N. Y. Fast Freight.
" 15—Philada. Fast Freight.
" 16—N. Y. Freight.
" 17—Philada. Freight.
" 18—South Amboy.
" 19—Greenwich
" 20—Through Cars.
" 21— " "

The cuts will be made at the west end of the car reported. Use letters in telegraphing cuts where given.

As noted above, the yard-master can make changes, puting Philadelphia stock on track 15 or 17, for instance, if he choose to do so, without troubling himself to inform anybody but the switch-tender.

But to return to our engine, having taken its position, equipped with its four poles, or stakes, or dolly-pieces (there seems to be no recognized technical name for the appliance) alongside the third car, one of the men, sitting on the end (of engine or of tender, as the case may be), being deft-handed from long practice, adjusts the pushing pole to the rear corner of the second car, and the first two, four, or more cars are started in less time than it takes to tell it. In the example cited the conductor would probably cut off 12 cars; the engineman (pushing against the second car) would, after giving them a good start, shut off to allow the pin to be pulled behind car 400; then, after another push, shut off again for the final cut behind 2,833; then, giving the latter a final send-off, three lots are on their way from one starting. The grade at Harrisburg is descending, about 15 or 20 ft. per mile. A slightly steeper descent would under some circumstances be better, but would require correspondingly greater vigilance on the part of the brakemen.

In a large yard with tracks 200 to 300 rods in length, the time spent by yard brakemen in returning to the train, after having ridden a car to its place, is an item worth considering. At Harrisburg the distance run by the cars when pushed from the train is from ⅛ to ⅝ mile, and the average distance traveled by the men in returning is probably above a quarter of a mile. Trains arrive so frequently that two engines are kept on duty; and the second one when not relieving the first (while it goes for coal, or water or lies off for dinner) is employed in *bringing back the brakemen*, running from the lowest practical point in the yard up to as near the train as a clear track can be found. Of course, in considering a smaller yard or a lighter run of business, we come to a point where it would be unprofitable to keep a locomotive for the almost exclusive purpose of giving the men pleasure rides; but at present, at least, the plan is regarded as well worth its cost.

The actual saving in time by this method of distributing trains is not easily ascertainable, but it is very considerable. Where one engine (and its crew) is employed exclusively in this branch of work, it may seem not worth while to go to expense for making a change until it is certain that the change will effect a positive saving, such as obviating the necessity of putting on an additional crew; but no argument is needed to show that time-saving, labor-saving, coal-saving, in short, money-saving, are questions that should be always kept in view. The percentage of switch-engine mileage to freight-train mileage in this country does seem heavy, not withstanding the fact that European practice shows still larger figures; and anything showing a prospect of reducing it is worthy of investigation. "Down-hill shunting," as is practiced more or less everywhere, and as is done quite extensively and profitably at certain points in England, as our readers will recall, is worthy of much more general investigation and introduction. It is no more right to push cars when they can just as well be run down hill by gravity than it is to erect a costly steam engine plant by the side of a constant and ample water-power.

But one of the chief savings effected by the side-pushing plan is in wear and tear (especially tear) of the draw-gear. Possibly the saving in broken draw-bars may be *the* largest one thing to the credit of the system. At Harrisburg the number of cuts in a train is perhaps larger than the average, because switching that might be done elsewhere is concentrated there; but however this may be, the testimony of the men acquainted with the work is that it would be well nigh impossible to handle such large and heavy trains by the ordinary plan. To "back-up" 69 heavy cars, for the purpose of kicking off the seventieth, does, indeed, have an unscientific look about it; and if the engineman reverses every time he shuts off (as he generally does if the time is limited), the strain on the 137 draw-bars is really a serious matter. If the runner does not feel in a hurry the process is slow and tedious. The first important essential in this plan is plenty of yard room and track, so that the parallel track occupied by the engine shall not be grudged; but if any superintendent is so cramped for room that he cannot lay a single inexpensive siding, it is high time that he look about for a location for a new yard, whatever plan he may intend to use.

THE SCRAP HEAP.

Born on the Train.

A 17-year-old wife traveling from Youngstown, Pa., to Dakota, in charge of a portly colored nurse, was one of the occupants of the sleeping car "Vancouver," which was attached to the Albert Lea's regular St. Paul train, leaving Chicago Monday morning. The train reached Hartland, a station 13 miles north of Albert Lea, about 10 minutes before midnight. A few minutes later the cry of a child was

heard, and investigation developed the fact that the young wife had given birth to a 12-pound boy. The next morning the other occupants of the car made up a purse and presented it to the mother with the request that it should be placed in a bank and remain untouched until the child had grown to manhood. They further requested that he be named "Albert Lea."—*St. Paul Pioneer-Press, Dec.* 1.

They Decided.

At a late meeting of a debating society in Kansas City the question was discussed: "Is Jay Gould a Philanthropist, or what?" The discussion was a hot one, and lasted an hour and a half, and then a vote was taken and it was decided by four majority that he was a "or what."

"Gentlemen," said a big man who looked into the room after the question was settled, "allow me to congratulate you. There's a crowd of fifty of us out here who were waiting for the verdict, and if it had been 'Philanthropist,' every blamed one of you would have been carried home on a shutter."—*Wall Street Daily News.*

A Grasping Monopoly.

It is said that some of the Western railroads even control the religion along their lines. A new resident of Ellendale, Dak., handed in a letter to one of the churches, and was asked:

"Did you come by the Blank & Blank Railroad?"

"No."

"Do you patronize the company's elevator at this station?"

"No."

"Have you signed a petition for lower freight rates?"

"I have."

"Then you had better take back your letter and apply to the Baptist Church, two blocks down and around the corner. That church hauls most everything by mule teams, while we stand in with the railroad."—*Wall Street Daily News.*

Greater than a Railroad Builder.

"Who are the benefactors of the human race?" thundered the lecturer, as he brought his hand down upon the desk with a thump that made a water spout rise out of the pitcher; "Who are the benefactors of the human race, I ask?"

"I guess I'm one of 'em," said a little man, rising in a back seat. The lecturer was rather taken aback, but after a pause he managed to inquire: "And what have you done—built a railroad?"

"No, sir; I've invented a bedbug poison."—*Toronto Truth.*

Pathfinders.

It's a very cold annual meeting that fails to bring out a Sunday train or pass crank.

When the Sultan of Morocco travels with his wife, if he can't get a pass he gets rates and goes by freight. There are 6,000 of Mrs. Morocco, with two counties to hear from.

"That new girl at the Ironclad restaurant is no good," said the newsboy, dejectedly, as he turned the good sides of the kiln-dried oranges out. "What is the matter?" asked the brakeman. "Oh, I took her to the firemen's hop down at the hall the other night, took her there in great shape, too, and that's the last I saw of her till the next day. She had another fellow waiting there with a bouquet as big as a headlight, another one to do all her dancing with, and another one to take her home. She said times were so slack and balls so seldom she had to put the boys on quarter time."—*Pathfinder Guide for December.*

Prizes for Station Agents.

The award of $50 each to the station agents of the Boston & Maine at Kennebunk, Madbury and Atkinson has been made by the company for the best kept grounds about their stations. A prize of $30 each has been awarded to the agents at Manchester and Newton Junction. A prize of $15 each is recommended for the agents at Rockport, Ballardvale, Reading Highlands, South Georgetown and Byfield.

Running Through Fire.

"A dispatch from Charleston, S. C., Dec. 1 says: "Extensive and destructive forest fires are raging between this city and Sumpter, on the Railroad of South Carolina, a distance of 90 miles. At Monck's Corner, 31 miles from the city, many plantation buildings are reported to have been destroyed. At Stony Landing Brick Works the fire surrounded the buildings, but was beaten back after it had destroyed over a hundred cords of wood. The train from Columbia tonight had to run between walls of fire miles in length, and extending up to the tracks."

An Eccentric Contradiction.

It is sometimes a little difficult to find the real meaning of some of the American papers which publish engravings and text upon engineering matters. The American *Mechanical Engineer* either changes its opinions so quickly or forgets so readily, that before it has filled one page it sometimes contradicts itself. Both the following paragraphs we extract from one page: "Devices for dispensing with eccentrics on steam engines are numerous, but have the disadvantage that they introduce about twice the number of working parts and details to be kept in order, without any corresponding benefit. It will be a long time before the eccentric is deposed. For its specific purpose nothing has yet appeared which is so simple and direct, so cheaply made, and so easily kept in order, or so universally understood by all who have charge of steam engines." Then in describing Cawley's "positive" valve gear it says, "This is a simple form of valve gear having a positive action which renders eccentrics unnecessary, although supplying a corresponding motion to the valves. An eccentric is a clumsy expedient for giving motion to a slide valve, because virtually it is but a crank with an abnormally large pin; and the great friction due to it, although often overlooked in general practice, becomes very apparent when an attempt is made to convert rectilinear into circular motion." This may not be either change of opinion or forgetfulness, but an evidence of perfect impartiality.—*The Engineer.*

Picked Up.

An old maid of this city recently traveled from here to Detroit, and took her first ride in a sleeping car. She was obliged to take an upper berth, and retired early. In the middle of the night she startled the whole car by a series of fortissimo shrieks. The porter ran to her assistance, and, in answer to his inquiry as to her distress, she replied that there was a man under her bed. After 40 years of patient waiting, her worst fears were realized.—*Chicago News.*

A Conductor's Record.

Captain Lewis Bailey, a veteran passenger conductor in the service of the Baltimore & Ohio Railroad, on Friday of last week took his last trip, the company having pensioned him at $1.25 per day. He is 69 years of age and is still hale and active, and would have preferred to continued in active service. Captain Bailey began in 1841 as fireman on the old Winchester & Potomac Railroad, running from Harper's Ferry to Winchester. In 1842 he was made conductor of a freight train, and in 1845 he was promoted to passenger conductor until the road was burned during the war. After its rebuilding and extension to Strasburg, he was still conductor, and then the road was finished to Harrisburg and then Staunton, and three years ago it was completed to Lexington, Captain Bailey extending his run with the completion of each division of the line. He never had an accident in which any of his passengers were injured. He is comfortably well off, and owns a house and lot in Winchester. In 1841 Bailey was at a station 7 miles east of Winchester, delivering wood from his father's farm to the railroad company, when a freight train with 8 cars came along. The engineer, who was also conductor and fireman, asked Bailey if he did not want a place to act as fireman, to which the latter gave an affirmative answer, and at once began duty. The road then had strap iron rails.—*Baltimore Sun.*

Locomotive Whistles at New Haven.

The Connecticut Railroad Commissioners have issued an order discontinuing railroad whistling within the limits of New Haven. In it they say: "Heretofore our orders for the whistle have been confined to the case of grade crossings of highways, but in this instance we are asked to make it general, which would include the signaling of flagmen, gate and switch tenders, brakemen, and in fact all those purposes for which the whistle is now used in the operations of the road. While the companies are unwilling to incur the responsibilities which a voluntary compliance with the wishes of the petitioners would involve, they profess their willingness to afford the desired relief, providing they can be protected by a positive order from us." The order is then made for the discontinuance of all whistling, that the bell be rung for grade crossings, and that signals to flagmen, etc., be given by the bell or in such other way as may seem best to the companies.

TECHNICAL.

The Twenty-four Hour System.

A dispatch from Pacific Junction, Ia., Dec. 8, says: "A movement is about to be made by the Union Pacific Railroad Co., that will have an important effect on railroads all over the country. It is the adoption by this road of the twenty-four hour o'clock scheme on its entire system. The order bringing about this change is in the hands of the printer and will soon be issued. Watchmakers are busy at work adapting Union Pacific watches and clocks to the new style of recording time, and it is expected that trains will be run on this standard, beginning with the new year."

Models of Old Locomotives.

The Baltimore *Sun* of Dec. 6 says: "The model of the old Peter Cooper locomotive, the first in use on the Baltimore & Ohio, and the little 'grasshopper' engine, which was at the Philadelphia Centennial Exhibition in 1876, were on Saturday placed in honorable retirement in the directors' room at the Central Building of the Baltimore & Ohio Co. in this city. These interesting examples of the locomotives of more than 50 years ago returned last week from New Orleans, where they had been on exhibition."

Engineers' Club of St. Louis.

The Club met Nov. 17. President McMath in the chair; 16 members and 2 visitors present. The Executive Committee reported the following programme for the year:

PROGRAMME 1886-87.

Nov. 17. Professor J. B. Johnson, "Earthwork Computations by the Prismoidal Formula."

Dec. 1. Chas. F. White, "Some Tests of Furnace Efficiency." Annual meeting and reports of officers.

Dec. 15. Prof. F. E. Nipher, "Economic Coefficient of the Shunt Dynamo." Announcement of result of letter ballot for officers.

Jan. 5. Prof. H. S. Pritchett, "Result of Mexican Longitude Determinations." T. T. Johnson, "Discussion of Discharge Measurements in Tunnels under Varying Heads."

Jan. 19. Dr. Welling Adams, "The Construction of Dynamo-Electric Machinery."

Feb. 2. E. D. Meier, "Evaporative Efficiency of Boilers."

Feb. 16. Robert Moore, "Water-way for Railroad Culverts."

March 2. E. E. Furney, "Compound Oscillating Engines."

March 16. Edward Flad, "Oscillations of Water in Stand Pipes."

April 6. Dr. C. M. Woodward, "Gas Producers for Ordinary Boilers.

April 20. C. W. Clark, "Experiments on Submerged Adjutages." D. E. Condon, "Experimental Studies relating to Water Supply."

May 4. J. W. Hill, J. T. Monell.

May 18. H. A. Wheeler, "Relative Economy of Machine and Hand Drilling." Chas. W. Mechler.

June 1. Report of Committee on "Smoke Prevention," Prof. W. B. Potter, Chairman.

On motion the report was adopted.

The Secretary read a communication from the American Society of Civil Engineers on the subject of changes in the organization of that body, and inviting a written communication from the Club on that subject. On motion, it was decided to refer the letter to a committee of five, a majority not to be members of the American Society of Civil Engineers. The Chair appointed on this committee: J. B. Johnson, H. W. Baker, F. H. Pond, Wm. Bouton and Robert Moore.

The special order of the evening, a paper by Prof. J. B. Johnson, was then taken up. The Professor called attention to inconveniences in using existing methods of Computing Earthwork by the Prismoidal Formula, as well as certain inaccuracies in them, illustrating his points by models. He called attention to a number of new tables he had calculated for use in such computations, and explained the formula he employed and the method of using the tables. The subject proved of considerable interest and was discussed by Messrs. Holman, Moore, Clark and Bouton.

On motion it was decided that a committee of five on nominations of officers be elected by ballot. The balloting resulted in the election of the following committee: S. B. Russell, Robt. Moore, Chas. W. Melcher, T. J. Whitman, Wm. Bouton. The club then adjourned.

The Club held its annual meeting Dec. 1, in St. Louis, 15 members and 1 visitor present. The Executive Committee reported the resignations of Jacob Johan and J. L. Stubblefield. Wm. L. Seddon, Benj. F. Crow, Chas. W. Bryan and Otis Breden were elected to membership. The Secretary then read his report for the past year. The annual report of the Treasurer was read, accepted and referred to the Executive Committee to be audited.

The Librarian submitted an informal report, stating that there had been no happenings of importance in his department. There was no change in the Association of Engineering Societies, except that it continued to improve. Its financial aspect was bright, and it was expected that there might be a surplus to devote to keeping up the index department.

President McMath read a report from the Executive Committee. It was accepted and ordered filed.

Mr. R. E. McMath, as Chairman of the Committee on National Public Works, made a verbal report. There had been no developments. The committee was continued.

The committee to whom was referred the letter from the American Society of Civil Engineers, on the subject of changes in that body, reported having drafted a letter which they recommended being forwarded to the American Society as the sentiment of the Club. The report was adopted, and the officers of the Club were authorized to forward the letter.

The committee on nominations of officers for the coming year reported as follows: For President, Wm. B. Potter; Vice-President, Mr. L. Holman; Librarian, J. B. Johnson; Secretary, W. H. Bryan; Treasurer, Edward Flad; directors, R. E. McMath and Wm. Wise.

The report was received and the committee discharged. Further nominations being called for, the name of Chas. W. Melcher was proposed for Treasurer. It was then directed that the letter ballot be taken in the usual way.

On motion, the Chair appointed Robert Moore, M. L. Holman and Wm. Bouton a special committee to confer with the Mercantile Library authorities on the subject of permanent quarters for the Club.

Chas. F. White addressed the Club on the subject offurnace efficiency, giving the results of some tests at the Anheuser-Busch brewery on evaporation and smoke prevention. The subject was discussed by Messrs. Breden, Bryan, Monell, Johnson, Bruner, Moore and Holman. Adjourned.

General Railroad News.

MEETINGS AND ANNOUNCEMENTS.

Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

Central, of Georgia, annual meeting, at the Banking House in Savanah, Ga., at 10 a. m., on Dec. 22; annual election, at the same place, at 10 a. m. on Jan. 3.

Housatonic, annual meeting, at the office in Bridgeport, Conn., Dec. 17.

Illinois Central, special meeting, at the office in Chicago, at 11 a. m. on Jan. 18, to vote on a proposed increase of capital stock.

Maine Central, annual meeting, at the office in Portland, Me., at 1 p. m. on Dec. 15.

New York, New Haven & Hartford, annual meeting, in New Haven, Conn., Dec. 15.

New York & New England, annual meeting, at the office in Boston, Dec. 14.

Peoria, Decatur & Evansville, special meeting, in Peoria, Ill., Dec. 20.

Providence & Worcester, annual meeting, at the office in Providence, R. I., at 10 a. m. on Feb. 7.

Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

Boston & Albany, 2 per cent., quarterly, payable Dec. 31, to stockholders of record on Dec. 2.

Boston & Lowell, 3 per cent., semi-annual, payable Jan. 1, to stockholders of record on Dec. 11.

Central, of Georgia, 4 per cent., semi-annual, payable Dec. 20, to stockholders of record on Dec. 1. This company paid 2 per cent. in June and 2 per cent. last December.

Fitchburg, 3 per cent., semi-annual, payable Jan. 1, to stockholders of record on Dec. 13. This company increases its dividend from 2½ to 3 per cent.

Morris & Essex (leased to Delaware, Lackawanna & Western), 3½ per cent., semi-annual, payable Jan. 3.

New York & Harlem (leased to New York Central & Hudson River), 4 per cent., semi-annual, payable Jan. 3.

Railroad and Technical Conventions.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The *Master Car-Builders' Club* holds its regular meetings at the rooms, No. 113 Liberty street, New York, on the third Thursday in each month.

The *New England Railroad Club* holds its regular meetings at its rooms in the Boston & Albany passenger station in Boston, on the second Wednesday of each month.

The *Western Railway Club* holds its regular meetings at its rooms in Chicago on the third Wednesday in each month.

The *Western Society of Engineers* holds its regular meet ings at its hall, No. 15 Washington street, Chicago, at 7:30 p. m., on the first Tuesday of each month.

Master Car-Builders' Club.

A business and social meeting of the Master Car-Builders' Club will be held at the Rooms, No. 113 Liberty street, New York, Thursday, Dec. 16, at 8 p. m. The subject for discussion will be: CAR WHEELS.

Wheelmakers are especially invited to meet with the club and give all the information they can relating to the subject, and be prepared to explain the cause of a new defect lately discovered in car wheels, and to present any objection they may have to the lately adopted form of standard wheel. Wheelmakers who cannot be present are invited to send a letter on the subject.

Train Dispatchers' Association.

The New York Branch of the American Train Dispatchers' Association held a meeting at High Bridge, N. Y., Nov. 28. Among those present were E. H. Lewis and J. F. Maguire, New York, Lake Erie & Western; W. C. Hartigan, C. H. Hopkins and W. J. Edwards, New York, Ontario & Western; M. W. Maguire, New York City & Northern; H. J. Quigg, Long Island; C. Halligan, Jr., West Shore; E. G. Webb, Rome, Watertown & Ogdensburg. Officers of the Branch are as follows: President, M. W. Maguire; Vice-President, H. J. Quigg; Secretary and Treasurer, W. C. Hartigan; Executive Committee, E. H. Lewis, C. H. Hopkins and C. Halligan, Jr. A committee was appointed to draft a suitable constitution and by-laws for use of the Branch.

Western Railway Club.

Next meeting of this club will be held in the Grand Pacific Hotel, Chicago, Dec. 15, at 2 p. m.

The subjects for discussion are:

1. Report of committee consisting of Messrs. Jacob Johann, B. K. Verbryck, and J. Townsend appointed to recommend rules respecting the replacing of broken draw-bars in interchange of cars. Mr. Johann will report.

2. Rules of Interchange of Cars, Nos. 9, 10 and 11. Mr. B. K. Verbryck will open this discussion.

3. What is the best form of packing for piston heads and for stuffing boxes? Mr. H. L. Cooper will introduce this subject.

The members of the Club will be pleased to receive in writing the views, on the subjects mentioned, of railroad men who cannot attend the meeting.

Organizing the "New York Railway Club."

The meeting for the purpose of organizing a railroad club in New York city was held, as announced, Tuesday evening, Dec. 7, at the rooms of the Master Car-Builders' Club, 113 Liberty street, New York.

Mr. R. C. Blackall, of the Delaware & Hudson Canal Co., was called to the chair and Mr. J. B. Brady, of the New York Central & Hudson River, acted as Secretary, some 40 prospective members in all were in attendance, but many letters and telegrams of an approving nature from prominent railroad men and friends were received and read. The matter was discussed at considerable length, and it was the unanimous opinion of all those present or represented by letter that such an organization would be of great advantage to all interested in railroad affairs, and that it would receive the necessary support if properly conducted.

A committee, consisting of W. R. Corwine, New York *World* and the *Time-Table;* William C. Tyler, *Railway Review;* Thos. Aldcorn, West Shore Railroad; J. B. Brady, New York Central; R. C. Blackall, Delaware & Hudson Canal Co., and Thos. Prosser, Jr., was appointed for the purpose of making a canvass among railroad officials in New York City and other railroad centres, and obtaining expression of opinions as to the advisability of organizing such an association. The meeting then adjourned, subject to the call of the committee. It is expected to call another meeting for definite action about Jan. 12, at rooms to be engaged up town in some central and convenient locality. That the club will be organized seems assured.

ELECTIONS AND APPOINTMENTS.

Atlantic Coast Line.—The following circulars from Engineer of Roadway, B. R. Dunn, are dated Wilmington, N. C., Dec. 1: "Mr. M. W. Divine is hereby appointed Roadmaster of the Wilson & Fayetteville and the Tarboro branches of the Wilmington & Weldon Railroad and the Albemarle & Raleigh Railroad, with headquarters at Wilson, N. C. He will be obeyed accordingly."

"Mr. T. J. Whitton is hereby appointed Inspector on the Wilmington, Columbia & Augusta Railroad, and the Northeastern and the Central Railroads of South Carolina, and will have charge of the receiving of all lumber, wood and ties on those lines."

Boston & Albany.—At the annual meeting in Boston, Dec. 8, the following directors were chosen: William Bliss, Boston; Henry Colt, Pittsfield; George O. Crocker, New Bedford; John Cummings, Woburn; Edward L. Davis, Worcester; Jarvis N. Dunham, Pittsfield; Edward B. Gillett, Westfield; Moses Kimball, Brookline; Jacob C. Rogers, Peabody; James A. Rumrill, Springfield; Charles S. Sargent, Brookline; Mahlon D. Spaulding, Augustus L. Soule, Boston.

Mr. Walter Shepard is appointed Assistant Chief Engineer in place of Mr. George R. Hardy, who has gone to the Lake Shore & Michigan Southern road.

Boston & Maine.—At the annual meeting in Boston, Dec. 8, the by-laws were amended so as to reduce the number of directors to nine, and the following were elected: George C. Lord, Amos Paul, Nathaniel J. Bradlee, James R. Nichols, William S. Stevens, Joseph S. Ricker, Richard Olney, Samuel C. Lawrence, Frank Jones.

Chicago & Indiana Coal.—Mr. L. A. Holmes has been appointed Car Accountant, with office at Brazil, Indiana.

Chicago & Southeastern.—The directors of this new company are: Richard C. Crawford, Theodore Keller, James Walsh and Horace Williston, all of Chicago.

Cincinnati Northwestern.—The officers are: President, J. R. Davey; Vice-President, T. C. Campbell; Treasurer and General Manager, Robert Simpson; Secretary, Wm. T. Simpson. Offices in Cincinnati.

Eastern.—At the annual meeting in Boston, Dec. 8, the following directors were chosen by the certificate holders: Samuel C. Lawrence, Medford; Samuel C. Cobb, William Simes, Boston; Walter Hunnewell, Wellesley; George Haywood, Concord; S. Endicott Peabody, Salem. The following were elected on the part of the stockholders: Arthur Sewall, Bath, Me.; N. J. Bradlee, Boston; Frank Jones, Portsmouth.

Florida Southern.—Mr. Cleveland Foot is Purchasing Agent, with office at No. 40 Broadway, New York. Mr. Wm. P. Couper, Chief Engineer, has been appointed Land Commissioner also.

Kanawha & Ohio.—The board recently elected officers as follows: President, Erwin Davis; Vice-President, Nelson Robinson; Secretary and Treasurer, E. R. Leland; General Manager, Thomas R. Sharp.

Mr. M. Esmilch is Acting General Freight and Passenger Agent in place of J. F. Story, resigned.

Knox & Lincoln.—At the annual meeting, Dec. 1, the following directors were chosen: John F. Berry, Francis Cobb, George W. Kimball, Rockland, Me.; E. O. Clark, Waldoboro, Me.; D. W. Chapman, Damariscotta, Me.; Eben Haggett, Newcastle, Me.; Henry Ingalls, Wiscasset, Me.; John R. Kelly, John G. Richardson, J. M. Wakefield, Bath, Maine.

Lafourche, Assumption & Ascension.—Mr. Pierre J. Gilbert, of Napoleonville, La., is Secretary of this company.

Louisville, New Albany & Chicago.—Mr. W. H. McDoel has been appointed Traffic Manager. Mr. Joseph J. Coleman succeeds Mr. McDoel as General Freight Agent. Mr. Coleman was recently on the Milwaukee & Northern road.

Milwaukee & Northern.—The following from General Superintendent C. F. Dutton is dated Milwaukee, Wis., Nov. 30: "J. C. Forester is appointed General Freight Agent of this road in place of J. J. Coleman, who has resigned to take a similar position on the Louisville, New Albany & Chicago Railway, appointment to take effect Dec. 1, 1886."

Mobile & Ohio.—At the annual meeting in Mobile, Ala., Dec. 1, the following directors were chosen: D. P. Bestor, August Belmont, Jr., W. Butler Duncan, James H. Fay, Henry Hall, Peter Hamilton, Wm. H. Hayes, Adrian Iselin, Jr., J. P. McMahon, E. Russell, Sidney Shepard, A. H. Stevens, T. M. R. Talcott.

Muskegon, Grand Rapids & Indiana.—The following order from General Freight Agent C. E. Gill is dated Grand Rapids, Mich., Dec. 1: "Mr. Charles F. Clugston is hereby appointed General Agent of this company, with headquarters at Muskegon, Michigan."

Norfolk & Western.—Mr. Walter L. Keen has been appointed Division Engineer of the Western Division, vice Mr. H. H. S. Handy, transferred; to take effect Dec. 1.

Northeastern & South Carolina.—This company, at its recent annual meeting in Charleston, S. C., lately, the following were chosen: President, A. F. Ravenel; directors, R. R. Bridgers, B. F. Newcomer, H. B. Plant, H. Walters, W. F. Walters, C. O. Witte.

Orange Belt.—The offices are at Longwood, Fla.; the officers are: P. A. Demens, President and General Manager; A. M. Taylor, Secretary; H. Sweetapple, Treasurer; G. D. Ackerly, General Freight and Passenger Agent.

Orangeburg & Lewisdale.—The office is in Orangeburg, S. C.; the officers are: President, R. C. Barkley; Vice-President, A. S. Hydrick; Secretary and Treasurer, W. E. Bull.

Pennsylvania.—The board has elected Robert W. Smith Treasurer, in place of John C. Taylor, deceased, and George E. Peabody Assistant Treasurer, in place of W. H. Frailey, deceased.

Pittsburgh & Connellsville.—This company (owned by the Baltimore & Ohio), at its annual meeting in Pittsburgh, Dec. 6, elected Robert Garrett, President; F. A. Barnes, George A. Berry, John W. Chalfant, Mendes Cohen, C. L. Fitzhugh, Thomas M. King, Johns McCleave, Wm. H. Metcalf, John D. Scully, Charles Webb, directors, J. B. Washington, Secretary and Treasurer.

Portland & Rochester.—At the annual meeting in Portland, Me., Dec. 1, the old directors and officers were all re-elected.

Providence & Springfield.—At the annual meeting in Providence, R. I., Dec. 1, the following directors were chosen: James O. Inman, Albert L. Sayles, Pascoag, R. I.; Horace A. Kimball, Edward Pierce, Jr., John L. Ross, Wm. Tinkham, Providence; Sidney Dillon, New York.

Pueblo & Eastern.—The office of this new company is in Pueblo, Col.; the officers are: President, Charles Henkel; Vice-President, M. Sheldon; Secretary, F. Rohrer; Treasurer, M. H. Fitch; Chief Engineer, H. R. Holbrook; Executive Committee, I. W. Stanton, Frank Pryor, A. McClelland.

Richmond & West Point Terminal Co.—At the annual meeting in Richmond, Va., Dec. 8, the following directors were chosen, the number being increased to 14 by vote of the stockholders: T. M. Logan, James B. Pace, E. D. Christian, Richmond, Va.; John Wanamaker, Philadelphia; George F. Stone, Henry M. Flagler, John G. Moore, Alfred Sully, J. A. Rutherford, John H. Inman, Simon Wormser, T. M. Lehman, J. J. Rice, New York; R. K. Dow, Claremont, N. H. The board elected Alfred Sully President; T. M. Logan, Vice-President.

Rumford Falls & Buckfield.—At the annual meeting in Portland, Me., last week, the following directors were chosen: George D. Bisbee, Otis Hayford, Canton, Me.; George C. Wing, Aburn, Me.; S. C. Andrews, C. R. Milliken, W. H. Moulton, W. L. Putnam, Portland, Me. The board re-elected W. L. Putnam President; Otis Hayford, Vice-President; R. O. Bradford, Secretary and Treasurer; L. L. Lincoln, Superintendent.

St. Louis & Central Illinois.—The officers of this company (successor to the St. Louis, Jerseyville & Springfield), are: President, Delos R. Haynes; Vice-President, Morris R. Locke; Secretary, L. C. Haynes; Treasurer and General Manager, H. A. Fisher; Superintendant, W. H. Hartman; General Freight and Passenger Agent, W. R. Church, General Counsel, Joseph Dickson.

St. Louis & Chicago.—The officers are: President, D. L. Wing; Chief Engineer, A. G. Klembeck; General Passenger Agent, A. C. Turny. Offices in Springfield, Illinois.

St. Louis Southern.—This road, formerly known as the St. Louis Coal Railroad, under a reorganization in effect Dec. 1, is now operated by the following officers: E. C. Dawes, President, St. Louis; C. W. Fairbanks, Vice-President, Indianapolis, Ind.; J. E. McGettigan, Treasurer, St. Louis; Edward Brown, Auditor, St. Louis; R. J. Cavett, Superintendent, Carbondale, Ill.; C. H. Bosworth, General Freight and Ticket Agent, Carbondale, Ill.; Jos. Crawford, Trainmaster, Carbondale, Ill.; James Anderson, Roadmaster, Carbondale, Ill.; John Fleming, Master Mechanic, Harrison, Illinois.

Tennessee Valley.—The office is in Memphis, Tenn.; the directors are J. C. Ferguson, John R. Goodwin, Wm. R. Moore, J. C. Neely, John Overton, Jr., H. Welter.

Texas & Pacific.—Chicago papers report that Mr. Jacob Johann has been appointed Master Mechanic, with office at Marshall, Tex. Mr. Johann is at present on the Chicago & Atlantic road. He is First-Vice President of the Master Mechanics' Association.

Utah Midland.—The directors of this new company are: H. D. Fisher, James J. Hagerman, Orlando Metcalf, D. B. Robinson, Henry T. Rogers, Colorado Springs, Col.; W. S. McCormick, Eli H. Murray, Salt Lake, Utah.

Wisconsin Central.—Mr. Henry C. Barlow has been appointed Assistant General Freight Agent. He was formerly on the Atchison, Topeka & Santa Fe, and more recently Traffic Manager of the Mexican Central.

PERSONAL.

—Mr. J. F. Story has resigned his position as General Freight and Passenger Agent of the Kanawha & Ohio road.

—Mr. C. F. Rand, Auditor of the Milwaukee, Lake Shore & Western Railroad, has resigned that position, and retires from railway service to engage in other pursuits.

—Mr. L. A. Holmes, Car Accountant of the Cincinnati, Wabash & Michigan Railroad, has tendered his resignation to accept a similar position with the Chicago & Indiana Coal Railroad.

—Mr. C. B. Cole, Master of Transportation of the Ohio & Mississippi, has resigned that office to accept a position on the Northern Pacific road. He has been on the Ohio & Mississippi for 14 years.

—Mr. George E. Peabody, just chosen Assistant Treasurer of the Pennsylvania Railroad Co., has been in the office of the company for many years, and has been acting as Assistant Treasurer since last April.

—Mr. Eliot C. Clarke, the well-known engineer of Boston, who has recently been the Chief Engineer of the Massachusetts Drainage Commission, and who was connected with the Boston Main Drainage-Works as Principal Assistant Engineer-in-charge, has been elected Treasurer of the Boott Cotton Mills, of Lowell, Massachusetts.

—Mr. Jacob Johann has resigned his office as Master Mechanic of the Chicago & Atlantic road to accept a similar position on the Texas & Pacific. Mr. Johann is a master mechanic of high standing and long experience, having served on the Wabash, the Missouri Pacific and other lines. He is First Vice-President of the Master Mechanics' Association.

—A number of friends of Mr. J. N. Abbott, so many years General Passenger Agent of the New York, Lake Erie & Western road, gave him a dinner in New York on the evening of Dec. 7. About 50 gentlemen were present, and many speeches were made, expressing good wishes for Mr. Abbott, congratulations on his appointment to his new position and regret at the necessity for his leaving New York.

—Mr. W. K. Jewett has recently been appointed Secretary and Treasurer of the Windsor Locks Steel Co. in which he is largely interested. The company's mills for rolling merchant steel are at Windsor Locks, Conn., and the offices are at Bridgeport. In order to accept this position Mr. Jewett has resigned his connection with the Pintosh Lighting Co., of which he has been Secretary since its organization.

—Mr. Charles W. Irish, of Iowa City, Ia., lately appointed by President Cleveland Surveyor-General of Nevada, is a railroad engineer of extended experience and a self-made man. He was engaged in surveying a great many western roads, his latest railroad work having been done on the Dakota extensions of the Chicago & Northwestern. Mr. Irish is President of the Engineers' Club of Iowa, and holds a high reputation in the profession.

—Mr. James Stewart, a well-known contractor of Lancaster, Pa., died at Oregon, Wis., Nov. 28. He had been extensively engaged in railroad contracting for many years and did a great deal of work through Pennsylvania and other states. He recently completed a large contract for the Baltimore & Ohio Railroad in the vicinity of Wilmington, Del., and was but recently awarded a contract for 39 miles on the Chicago, Madison & Northern road, which included a tunnel 1,100 feet long. It was during his visit to Wisconsin in connection with this contract that his death occurred.

—The venerable Capt. Charles L. Gager died Dec. 2 at his residence in Buffalo, N. Y., aged 86 years. He was an old resident of Buffalo and was well known, especially in marine circles. For many years he was identified with the lake business. He built the steamer "Albany," and also owned the steamboat "Red Jacket," which ran on Niagara River. It was one of the first steamboats in this part of the great lakes. In his younger days Capt. Gager was engaged as an ocean trader, and made several coasting voyages to Key West and other ports. He will be well remembered among the older class of men engaged in lake navigation.

—Mr. Robert W. Smith, who has just been chosen Treasurer of the Pennsylvania Railroad Co., was with the house of Harris & Leech for several years when that firm was largely engaged in the forwarding business to and from Philadelphia and the West. The experience gained with them qualified him for the position of Eastern Superintendent of the Empire Fast Freight Line, organized in connection with the Philadelphia & Erie Railroad, when that line was opened for traffic in 1865. He was afterwards Secretary and Treasurer of the American Steamship Co., a position he still holds, but it is now only a nominal one. For the past two years he has been Treasurer of the Norfolk & Western Railroad, where his duties have been discharged with much credit to himself and to the satisfaction of the directors of that corporation. It is understood that he will assume the responsible duties of his new position on Jan. 1 next.

—Mr. Alfred R. Fiske died in Pottsville, Pa., Nov. 30, aged 68 years. Mr. Fiske was born in Massachusetts, and resided in the eastern states during the years of his early manhood, being engaged at his trade of machinist, and subsequently engaged in the construction of cotton mills. In the year 1850 he removed to Shamokin, Pa., and took charge of the Suntury & Shamokin Railroad, which was afterward leased by the Northern Central, which road he continued in charge of until 1868, when he was made General Manager of all the lines of the Northern Central road, with headquarters at Harrisburg. He continued in this position until 1873, when he resigned to accept the superintendency of the Fishbach Mills and Pioneer Furnaces in Pottsville for Mr. Charles M. Atkins. He lived in Pottsville until the spring of 1876, when he left Mr. Atkins to take charge of the Long Island road, after which he became consulting engineer of the New York, New England & Western Investment Co., of New York, a position which he held until ill health compelled him to forego business.

—Mr. Robert Newland Brown, of Buffalo, N. Y., died at Wiesbaden, Germany, Nov. 16, aged 70 years. He was born at Brownsville, N. Y., and early chose civil engineering as his profession. His brother Thomas, who had previously won distinction as Chief Engineer in charge of the construction of a railroad between St. Petersburg and Moscow, had become Chief Engineer of the Erie Railroad. Robert was given a subordinate position on the road, and gradually worked himself up, becoming Division Superintendent from Hornellsville west, about 1854. Afterward he moved to Niagara Falls and was Superintendent of a road running to Canandaigua. He went to Buffalo in 1856 as Superintendent of the Buffalo & Erie, now a part of the Lake Shore & Michigan Southern, and afterward became one of the superintendents of the Erie. He retired from active life about 12 years ago. His health has gradually been failing and two years ago he went abroad with a nephew, Jacob Brown, of Philadelphia, and has since spent most of his time in the watering places of England and Germany.

—Mr. George Noble, General Manager of the Texas & Pacific, died at his residence in Dallas, Tex., Dec. 4, after a brief illness. His death was entirely unexpected, and his sickness was not considered dangerous until a short time before his death. Mr. Noble was born in Franklin County, Pa., and was in his 56th year at the time of his death. From early manhood to 1866 he was connected with the Pennsylvania Railroad. From that year to 1874 he was connected with the Kansas Pacific, and lived at Lawrence, Kan. From 1874 to 1881 he was General Superintendent of the Texas Pacific. In January, 1886, he was appointed General Agent for the Receivers of the Texas & Pacific, which position he held up to a few weeks ago, when he was made General Manager. The funeral took place on Tuesday, Dec. 7, and his remains were interred in Trinity Cemetery. Mr. Noble was one of the most popular railroad men ever known in Texas, particularly among the employés under him, who, from the highest to the lowest, had the most sincere regard for him because of his uniform kindness and fairness to them. The good-will and friendship of the Dallas people generally for him was of the most pronounced character, and his death causes general regret among them.

—Mr. Martin Coryell died at his residence in Lambertville, N. J., Nov. 29, aged 71 years. He was born in New Hope, Pa., in 1815, and was educated principally in the schools of his native town and of Lambertville, N. J., to which place he returned for permanent residence, 50 years later. With the exception of a brief period in youth, during which, to restore his failing health, he learned and practiced for a few months the carpenter's trade, and another brief period, later in life, when he read law for a time in the office of B. H. Brewster, of Philadelphia, afterward Attorney-General of the United States, Mr. Coryell spent his life as an active civil and mining engineer. The Delaware Division Canal, the Raritan Canal, and the Brunswick Canal are among those upon which Mr. Coryell was employed. Under the superintendence of Ashbel Welch, he located the greater part of the Belvidere Delaware Railroad, and directed its construction from Trenton to Lambertville. He was also active as a mining engineer, being one of the early pioneers of mining in the Lake Superior copper region, and had much to do with the development of the Hazleton coal field and the railroad which has since expanded into the Lehigh Valley system. In 1862, he removed to Wilkes-Barre, Pa., where in 1864 he became Manager of the Warrior Run Mining Co. From that time his attention was devoted entirely to mining, and he had a very large practice as a consulting engineer. He was one of the founders of the American Institute of Mining Engineers, of which he was always an active member.

TRAFFIC AND EARNINGS.

Traffic Notes.

The El Paso Freight Association met in St. Louis, Nov. 20, for the purpose of adjusting rates to points in Arizona, New Mexico and Mexico. Only routine business was transacted.

A meeting was held in St. Louis, Nov. 29, at which the Ottumwa pool was organized.

At a meeting held in Chicago, Dec. 2, the Iowa, Minnesota

& Dakota Traffic Association completed its organization, and the agreement was signed by the companies represented.

A meeting of the Executive Committee of the Chicago-Ohio River Pool will be held in Chicago, Dec. 14, for the purpose of completing the organization of the so-called sixth pool.

Pacific Coast Passenger Association.

At a meeting held in Chicago, Dec. 3, arrangements were completed for forming a temporary pool on business from the Pacific Coast to through Eastern points. The agreement took effect Dec. 6 and is to continue in force for four months, and is regarded as temporary and provisional—to be replaced as soon as possible by a permanent agreement.

Northwestern Traffic Association.

A meeting of the Northwestern Traffic Association was held in Chicago, Dec. 2, at which the Wabash and the Central Iowa companies gave notice of their willingness to sign the agreement. The question of making new divisions so as to include these roads was referred to the commissioner.

Lake Superior Iron Ore.

Shipments of iron ore from the Lake Superior regions from the opening of navigation up to Nov. 24 are reported by the Marquette *Mining Journal* as follows:

		Tons.
Marquette District,	Marquette	850,586
" "	St. Ignace	73,293
" "	Escanaba	667,575
Total Marquette District		1,591,454
Menominee District,	Escanaba	871,246
Gogebic "	Ashland	709,405
Vermillion "	Two Harbors	304,396
Total		3,476,501

The season is now substantially closed, and only a few tons will be added by the final reports. The total shipments last year to the corresponding date were 2,375,720 tons, showing an increase this year of 1,100,841 tons, or 46.3 per cent.

Pig-iron shipments this year have been: Marquette, 8,050; St. Ignace, 9,780; total, 17,830 tons.

The total shipments from Escanaba this year were 1,538,821 tons.

Coal.

Anthracite coal tonnage for the week ending Nov. 27 was 632,233 tons. The total tonnage for the eleven months to Nov. 27, as given by the weekly reports of the companies was, this year, 28,845,442; last year, 28,361,456; increase, 483,986 tons, or 1.8 per cent. The cold weather has improved the demand for coal, and a more active market is reported. It has been decided to make no change in the price lists for December.

Bituminous coal tonnages reported for the eleven months to Nov. 27 are as follows:

	1886.	1885.	Inc. or Dec.	P.c.
Cumberland, all lines	2,290,434	2,554,607	D. 264,173	10.3
Hun. & Broad Top	345,460	153,740	I. 191,720	124.7
Barclay R. R.	163,506	212,713	D. 49,147	23.1
Beech Creek R.R.	934,606	695,895	I. 238,711	34.1
Pennsylvania R. R.:				
Clearfield	1,993,421	2,624,525	D. 631,104	28.0
Mountain District	614,860	491,821	I. 123,039	25.1
Penn and Westmore.	1,144,956	1,165,311	D. 20,355	1.7
Minor districts	1,278,984	982,757	I. 296,227	30.2
Chesapeake & Ohio	1,115,750	1,000,998	I. 114,752	11.4
Norfolk & Western	780,666	538,487	I. 242,179	45.0
Total	10,662,703	10,420,854	I. 241,849	2.3

The bituminous trade is generally reported in a fairly prosperous condition.

Coke tonnages for the eleven months to Nov. 27 are reported as follows:

	1886.	1885.	Inc. or Dec.	P. c.
Southwest Penna. R. R.	2,418,224	1,758,256	I. 659,968	37.5
Other districts, Pa. R. R.	743,583	569,127	I. 174,456	30.6
Connellsville, *via* Pa. R. R.	48,580	55,608	D. 7,028	12.6
Total	3,210,387	2,382,991	I. 827,396	34.7

All these tonnages are over the Pennsylvania Railroad, which is the only line reporting coke shipments regularly.

For the eleven months to Nov. 30, the Tennessee Coal, Iron & Railroad Co. reports shipments of 119,196 tons of coal and 124,038 tons of coke; a total of 243,234 tons.

Cumberland coal shipments for the week ending Dec. 4 were 56,175 tons. Total to Dec. 4 this year, 2,346,609; last year, 2,621,259; decrease, 274,650 tons, or 10.5 per cent.

Cotton.

Cotton movement for three months of the crop year from Sept. 1 to Dec. 3 is given by the *Commercial and Financial Chronicle* as follows, in bales:

Interior markets:	1886.	1885.	Inc. or Dec.	P. c.
Receipts	1,880,837	1,872,886	I. 7,951	0 4
Shipments	1,538,065	1,506,109	I. 31,956	2.1
Stock, Dec. 3	399,832	382,627	I. 8,205	2 1
Seaports:				
Receipts	2,713,590	2,668,079	I. 45,511	1.7
Exports	1,492,222	1,472,694	I. 19,528	1.3
Stock, Dec. 3	990,169	910,033	I. 80,136	8.8

A considerable part of the shipments from the interior markets reappears in the receipts at the seaports, so that the total receipts given above are considerably in excess of the actual amount received from plantations.

The *Chronicle* says: "In the table below we give the receipts from plantations, and add to them the net overland movement to Dec. 1, and also give the takings by Southern spinners to the same date, so as to give substantially the amount of cotton now in sight.

	1886.	1885.	1884.	1883.
Receipts at the ports to Dec. 3	2,713,590	2,668,079	2,781,751	2,685,708
Interior stocks on Dec. 3 in excess of Sept. 1.	342,772	366,777	298,804	337,321
Total receipts from plantations	3,056,362	3,034,856	3,080,555	3,023,029
Net overland to Dec. 1.	321,366	311,137	227,855	261,252
Southern consumption to Dec. 1	105,000	89,000	78,000	87,000
Total in sight Dec. 3.	3,482,728	3,464,993	3,386,410	3,371,341
Northern spinners' takings to Dec. 3	701,281	735,955	569,039	704,278

"It will be seen by the above that the increase in amount in sight Dec. 3, as compared with last year, is 17,735 bales, the increase as compared with 1884 is 96,318 bales, and the increase over 1883 is 111,387 bales."

Southern Railway & Steamship Association.

The following, from General Commissioner Virgil Powers, is dated Atlanta, Ga., Dec. 3:

"A meeting of Claim Agents will be held in Atlanta, Ga., on Wednesday, Dec. 15, 1886, at 10 o'clock a. m., to revise, amend and codify the claim rules now in force over the different roads. After their work is perfected a report will be submitted to the Rate Committee, a meeting of which is hereby called to meet at this office on Thursday, Dec. 16, for their review and adoption and for consideration of rates and classification between all points.

"The report upon claim rules will be first business taken up."

Railroad Earnings.

Earnings of railroad lines for various periods are reported as follows:

	1886.	1885.	Inc. or Dec.	P. c.
Eleven months to Nov. 30:				
Buff., N. Y. & P.	$2,369,944	$2,209,670	I. $160,274	7.2
Buff., R. & Pitts.	1,131,818	1,143,311	D. 11,493	1.0
Bur., C. R. & No.	2,626,530	2,826,605	D. 200,075	7.1
Cairo, V. & C.	590,892	.....	.....	...
Central Iowa.	1,198,121	1,179,651	I. 18,470	1.6
Chi. & Alton	7,305,775	7,289,243	I. 16,532	0.2
Chic. & Atlantic	1,472,492	1,216,823	I. 255,669	21.2
Chi. & East. Ill.	1,598,904	1,509,877	I. 89,027	5.9
Chi., Mil. & St. P.	22,469,876	22,077,017	I. 392,859	1.8
Chic. & N. W.	23,130,418	22,329,520	I. 800,898	3.6
C., St. P., M. & O.	5,577,205	5,349,312	I. 227,893	4.3
Chic. & W. Mich.	1,287,330	1,188,384	I. 98,946	8.3
C., I., St. L. & C.	2,355,428	2,167,761	I. 187,667	8.7
Cin., W. & Balt.	1,823,377	1,538,403	I. 289,974	18.8
Cleve., Ak. & Col.	484,172	455,916	I. 28,256	6.2
Den. & R. G.	6,134,942	5,614,875	I. 520,067	9.3
Det., Lan. & No.	1,118,870	1,122,419	D. 3,549	0.3
Ft. Worth & D.	390,891	430,265	D. 39,371	9.1
Illinois Central.	9,539,609	9,791,052	D. 251,443	2.6
Iowa lines.	1,565,428	1,494,556	I. 70,872	4.7
Ind., Bloom. & W.	2,332,837	2,148,660	I. 184,177	8.6
Long Island	2,807,794	2,663,381	I. 144,413	5.4
Louisv. & Nash.	12,718,144	12,512,562	I. 205,582	1.6
L., N. A. & Chic.	1,709,785	1,540,643	I. 169 142	10.9
Mexican Central	3,414,231	3,221 270	I. 192,961	5.9
Mil., L. S. & W.	2,136,804	1,258 029	I. 878.775	69.8
Mil. & Northern	586,355	514.434	I. 71,921	14.0
Mobile & Ohio	1,782,113	1,901,421	D. 118 308	6.2
N. Y., Ont. & W.	1,234,676	1,154,826	I. 80,050	7.0
Norfolk & West.	2,969,071	2,498,679	I. 470,402	18.8
Northern Pacific	11,434,933	10,574,328	I. 860 605	8.2
Ohio & Miss	3,561,828	3,389,770	I. 172,058	5.1
Ohio Southern	475 918	425.950	I. 49 968	11.7
Peoria, Dec. & E.	731 631	671,222	I. 60.409	9.0
St. Jo. & Gd. I.	1,056,907	990,979	I. 65.928	6 7
St. L., Ark. & T.	1,570,849	1,125,266	I. 445,583	39 6
St. L. & San F.	4,388,721	4,010,864	I. 267.357	6.6
St. P. & Duluth.	1,399,060	1,261,812	I. 137,248	10.9
St. P., M. & Man.	6,706,854	6,840.558	D. 133,704	1.9
Tol. & Ohio Cen.	737,302	.....	.....	...
Wab., St. L. & P.	11,638,726	10,837,584	I. 801,142	7.5
Ten months to Oct. 31:				
Atch., T. & S. F.	$12,740,023	$12,714,600	I. $25,414	0.2
Net earnings	6,124.657	6,045.404	I. 79,253	1.3
Canadian Pac.	8,114,416	6,823,217	I 1,291,199	18.6
Net earnings	2,975,004	2,682,180	I. 292,824	10.9
Chi., Bur. & Q.	22,103,637	21,908,397	I. 195,240	0.9
Net earnings	10,704 619	10,117,345	I. 587,274	5.8
Den. & R. G. W.	859,953	848,263	I. 11,684	1.4
Net earnings	263, 27	254,978	I. 8,149	3.3
Louisv. & Nashv.	11,434,154	11,380,124	I. 50,030	0.4
Net earnings	4,448.094	4,411.240	I. 36 854	0.8
Lou., N. O. & T.	1,189,905	934.546	I. 255,359	38.0
Net earnings	306,305	133.957	I. 172,348	128.6
Mexican Central	3,036,828	2,900,382	I 136,446	4.7
Net earnings	993,172	1,198,241	D. 205,069	17.1
N. Y. & New E.	3,289 109	2,828,704	I. 460.405	16.3
Net earnings	1,186,263	1,007,039	I. 179,224	17.8
N. Y., Sus. & W.	909,160	908,606	I. 554	0.1
Net earnings	382 578	419.114	D. 36,536	8.7
Shenandoah Val.	615.287	579,014	I. 36.273	6 3
Net earnings	70,530	29,387	I. 41,143	140.0
Union Pacific	21,908,823	20,589,351	I. 919,472	4.4
Net earnings	7,396 806	7,760,328	D. 433.522	5.6
Nine months to Sept 30:				
California South.	$496.510	.....	.....	...
Net earnings	*16.590	.....	.....	....
Ch., C., C. & I.	3,018,852	$2,632,271	I. $386,581	14.6
Net earnings	1,092,917	620,974	I. 451,943	72.8
Sonora	204,240	202,302	D. 18,062	8.1
Net earnings	4 122	39,306	D. 35,184	90.0
Month of September:				
California South.	$67 803	.....	.....	....
Net earnings	11,914	.....	.....	....
Ch., C., C. & I.	442,955	$360,208	I. $82,747	22.9
Net earnings	209,314	132,200	I. 77,114	58.4
Sonora	26,372	24,708	I. 1,664	6 7
Net earnings	* ,501	1,104	D. 2,605	...
Month of October:				
Atch., T. & S. F.	$1,687,348	$1,676,075	I. $11,273	0.7
Net earnings	1,019 577	1,009,759	I. 9,818	0.9
Canadian Pac.	1,077.630	915,838	I. 161,792	17.7
Net earnings	467.946	392,797	I. 75.149	19.1
Chi., Bur. & Q.	2,776,774	2,858,258	D. 81,484	2.9
Net earnings	1,568,944	1,667,610	D. 98,666	5.9
Ches. & Ohio	372,031	307,438	I. 64,595	21.0
Net earnings	128,380	108,768	I. 19,612	18.0
Ches., O. & S. W.	181,446	163,106	I. 18,330	11 2
Net earnings	84.122	67,441	I. 16,681	24.8
Den. & R. G. W.	112,687	126,883	D. 14,196	11 2
Net earnings	50,418	60 180	D. 9,762	16.2
E. Ten., Va. & G.	456,616	411,380	I. 45,236	11.1
Net earnings	244.309	191,708	I. 52,601	27.6
Eliz., Lex. & B. S.	90,673	70,832	I. 19,741	28.0
Net earnings	33,481	34,038	I. 443	1.3
Louisv. & Nash.	1,383,753	1,263,469	I. 120,284	9.7
Net earnings	581.404	544.190	I. 37,214	6.8
L., N. O. & Tex.	197,372	163,201	I. 36.171	21.6
Net earnings	85,705	69.381	I. 16,324	23.6
Mexican Cen.	346,053	249 884	I. 96,169	38 5
Net earnings	149,036	74,274	I. 74,762	100 1
N. Y. & New E.	381,180	339,963	I. 41,217	12.1
Net earnings	158.509	150,705	I. 7,804	5.2
N. Y., Sus. & W.	109,868	105,087	I. 4,781	4.5
Net earnings	49.014	49,738	D. 104	0.2
Shenandoah Val.	81,954	66,268	I. 15,686	23.7
Net earnings	4,012	10,682	D. 6,670	62.2
Union Pacific	2,755,154	2,714,608	I. 40,546	1.5
Net earnings	1,181,565	1,306 220	D. 124,655	9.6
Month of November:				
Buff., N. Y. & P.	$199,200	$211 000	D. $11,800	5.6
Buff., Roch. & P.	125 327	117,543	I. 7,784	6.6
Bur., C. R. & No.	290,670	313,006	D. 22,336	7.1
Cairo, V. & C.	60,576	44,472	I. 16,104	36 3
Central Iowa	132,450	123,716	I. 8,734	7.2
Chic. & Alton	764,343	733 037	I. 31,306	4.3
Chicago & Atl.	152,461	115,573	I. 36,888	31.8
Chi. & East. Ill.	164,751	161,011	I. 3,740	2.3
Chi., Mil. & St. P.	2,469,000	2,038 429	D. 169 429	6 4
Chic. & N. W.	2,363,100	2,259,500	I. 103,600	4.6
C., St. P., M. & O.	624,200	589,000	I. 35,200	6.0
Chi. & W. Mich.	132,257	116,881	I. 15,376	13.2
C., I., St. L. & C.	206,447	194,678	I. 11,769	6.0
Cin., W. & Balt.	187,079	142,895	I. 44,184	30.9
Cleve., Ak. & Col.	40,281	35,994	I. 4,287	11.6
Den. & R. G.	671,040	572,983	I. 98,057	17.1
Det., Lan. & No.	101,690	99 272	I. 2,418	2.4
Ft. Worth & Den.	50,500	43,513	I. 6,987	15.9
Illinois Central	1,022,715	1,043,976	D. 21,261	2.0
Iowa lines	144,076	144,350	D. 244	0.2
Ind., B & W	227,368	207,396	I. 19,972	9.6
Long Island	217,090	198,200	I. 18,821	9.5
Louis. & Nash.	1,285,990	1,129,894	I. 156,096	13.8
Louis., N. A. & C.	176,225	171,454	I. 4,771	2.8
Manhattan	667,482	590,893	I. 76,589	12.9
Mexican Central	377,410	340 887	I. 50,523	17 7
Mil., L. S. & W.	194,449	152,994	I. 61,455	46.2
Mil. & Northern	64 173	50,314	I. 13,859	27.6
Mobile & Ohio	262,968	260,132	I. 2,836	10 9
N., Y. Ont. & W.	106,238	106,541	D. 303	0.3
Norfolk & West.	322,059	247,623	I. 74,436	30.0
Northern Pacific	1,304,952	1,249,358	I. 55,594	4.4
Ohio & Miss.	341,978	316,620	I. 25,358	8.0
Ohio Southern	59,981	48,874	I. 11 107	22.6
Peoria, Dec. & E.	62,486	61,737	I. 749	1.2
St. Jo. & Gd. I.	95 299	83,580	I. 11,719	14.0
St. L., Ark. & T.	205,501	175,917	I. 29 584	16 8
St. Louis & San F.	462,961	466,824	D. 3,863	0.9
St. P. & Duluth.	149,501	167,007	D. 17,506	10 5
St. P., Min. & M.	805,662	865,877	D. 60,215	6.9
Tol. & Ohio Cen.	81,033	36,285	I. 44,748	123.3
Wab., St. L. & P.	1,088,000	1,153,000	D. 65,000	5 6

* Deficit.

Mexican Central and Sonora Railroad earnings as given above are in Mexican currency.

Weekly earnings are usually estimated in part, and are subject to correction by later statements. The same remark applies to early statements of monthly earnings.

Chicago Shipments Eastward.

The Board of Trade reports east-bound shipments from Chicago for the week ending Dec. 4 as follows, in tons:

	Tons.	P. c.		Tons.	P.c.
Chi. & Gd. Trunk	4,286	10.7	Pitts., Ft. W. & C.	7,076	17.2
Mich Central	5,844	14.3	Chi., St. L. & Pitts.	5,516	13.5
Lake Shore	5,234	13.0	Balt. & Ohio	4,602	11.2
N. Y., Chi. & St. L.	4,891	11.9	C., Ind., St. L. & C.	3,386	8.2

The statement includes local as well as through shipments. The total for the week was 40,935 tons, being an increase of 5,473 tons, or 15.4 per cent., over the preceeding week. These shipments were the heaviest for four weeks, although they were exceeded in every week in October and in the first week in November.

Shipments for eight weeks past by these reports have been, in tons:

Week ending							
Oct. 16.	Oct. 23.	Oct. 30.	Nov. 6.	Nov. 13.	Nov. 20.	Nov. 27	Dec. 4.
41,347	45,820	46,688	41,883	37,051	38,409	35,462	40,935

Shipments by the Chicago & Atlantic road are not included above; the through tonnage by that line for the week ending Dec. 4 is given at 4,620 tons. These shipments include dead freight only.

Central Traffic Association.

A meeting of compilers and rate clerks will be held in Chicago, Dec. 17, for the purpose of revising and correcting the passenger rate-sheets. As this is the first general meeting of the kind, it is hoped that every important line will be represented, and that every compiler, including the compilers of the Mississippi River, the Missouri River, the Kansas, the Nebraska, and the Colorado rate sheets will be present.

Hereafter, in accordance with a resolution adopted by the Passenger Department at its last meeting, these rate-sheet meetings will be held monthly, on the 17th of each month, or the 18th, should the 17th fall on Sunday.

Central Traffic Association.

A call for a general meeting has been issued by Commissioner Blanchard, to be held in Chicago, Tuesday, Dec. 14, at 10:30 a. m. The subjects to be considered are as follows:

1. The consideration of the proposed contract of the association, and committee reports as follows:
2. On Pools from the Lake Cities;
3. On the relations of the Lehigh Valley and the Chesapeake & Ohio to the Association;
4. On rates *via* the Chesapeake & Ohio, as related to the rates via the Association roads;
5. To recommend permanent arbitrators;
6. On live stock and dressed beef;
7. The operation of the resolutions advancing the billing weights on live stock, to cover the excess weights not now being charged for;
8. The report of the committee of auditors appointed to revise the basis for apportionment of the expenses of the Association, and audit the accounts of the Commissioner;
9. The report by the Commissioner on the revision of the existing percentages with the Pacific Coast lines;
10. The nomination of the Tobacco and Cotton Rate and Classification committees;
11. Action on the resolutions offered by Judge Burke at the last meeting, relative to frequent meetings of the Association and full representation of all lines;
12. Report as to companies that have not yet affixed their signatures to the passenger agreement;
13. The progress of passenger pools;
14. Action upon the payment of passenger commissions to agents in trunk line territory. Any other business pertinent to the freight or passenger traffic of the Association.

A full attendance is earnestly requested.

RAILROAD LAW.

Master and Servant—Defective Machinery.

In the case of Bradford against the Texas & Pacific Co., the Texas Supreme Court reverses the decision of the lower court for plaintiff, holding as follows:

The liability of the master to the servant for injuries resulting from the use of defective implements arises from the fact that it is the duty of the master to furnish implements not defective; and the servant, unless the defect be patent, may assume that the master in this respect has performed his duty. But when he has knowledge that the master has not done so, if he continues in the employment in which such defective implements are used, he must ordinarily be held to assume the risks incident to the service as it is attempted to be carried on, and not to assume only the risks incident to such, since when carried on with implements not defective of their kind, and suitable to the work undertaken, it is not the duty of a servant to assume and exercise the duties of an inspector that he may detect imperfections in implements not open to common observation; but if he learns of such imperfections then it is incumbent upon him not to expose himself to dangers resulting from them, and, if after such knowledge he exposes himself to such dangers it must be held that he assumes the risk of injury from the known defect, although the master as well as the servant had knowledge that the defective implement was used in the business."

Suits to Test the Validity of Pools.

A Philadelphia dispatch of Dec. 8 says: "Attorney General Cassidy this afternoon filed bills in equity in the anthracite coal combination and the trunk line pool cases, and asked that preliminary injunctions be granted, suggesting that they be made returnable in 10 days. The defendants in the trunk line pool are the Grand Trunk Co. of Canada; New York Central & Hudson River; West Shore; Delaware, Lackawanna & Western; New York, Lake Erie & Western; Pennsylvania; Baltimore & Ohio; Lehigh Valley; Philadelphia & Reading; Allegheny Valley; Buffalo New York & Philadelphia; Cincinnati, Washington & Baltimore; New York, Pennsylvania & Ohio; Pennsylvania Co.; Philadelphia, Wilmington & Baltimore; Pittsburgh, Cincinnati & St. Louis; Lake Shore & Michigan Southern; New York, Chicago & St. Louis; Pittsburgh, Fort Wayne & Chicago, and the Pittsburgh & Lake Erie companies. The Attorney General sets forth the different contracts and agreements made by the several companies, and prays that they may be restrained from consummating them.

In the anthracite coal combination bill the defendants are the Philadelphia & Reading Railroad Co.; Philadelphia & Reading Coal & Iron Co.; Lehigh Valley; Delaware, Lackawanna & Western; Delaware & Hudson Canal Co.; Pennsylvania Railroad Co.; Pennsylvania Coal Co.; New York, Lake Erie & Western; Lehigh Coal & Navigation Co.; Lehigh Valley Coal Co.; Susquehanna Coal Co.; Mineral Railroad & Mining Co.; Summit Branch Co., and the Lykens Valley Coal Co. Attorney General Cassidy claims that the combinations of the trunk lines and coal companies are detrimental to the welfare of the state, and prays the Court to declare them unlawful. Judge Simonton fixed Dec. 21 as the day for argument on the preliminary injunction.

"Attorney General Cassidy's action to-day in filing bills in equity against the trunk line pool and coal combination is in pursuance of instructions issued to him by the Governor early in the fall."

OLD AND NEW ROADS.

Atchison, Topeka & Santa Fe.—A Chicago despatch of Dec. 8 says: Apparently well authenticated reports are current that the Atchison, Topeka & Santa Fe Co., has concluded a deal with F. E. Hinckley by which it obtains control of the Chicago & St. Louis Railroad. If the report turns out to be correct it will enable the Atchison Co. to secure an entrance into Chicago and excellent terminal facilities in this city. The Chicago & St. Louis comes into the city over the Great Western Terminal Co.'s line, and uses, jointly with the Wisconsin Central, the station at Fifth avenue and Polk street. It runs from Chicago to Joliet, thence by way of Streator over what was formerly the Chicago, Pekin & Southwestern, to Pekin. Extensions are contemplated, or in progress, between Pekin and Springfield, from which points another extension is to be built to connect with the new Litchfield road for St. Louis.

"The Santa Fe, it is said, contemplates using the Chicago & St. Louis road between Chicago and Streator as the Chicago end of its new Kansas City line. From Streator a new road is to be built at once to Fort Madison, Ia., and thence, through Missouri, to Kansas City. The latter lines have already been surveyed and incorporated, and, therefore, nothing remains to be done except to begin the active work of construction. This is to be done without any further delay, and it is reported that the Santa Fe has already bought 20,000 tons of new steel rails to be delivered at once at Streator for the ironing of the new extension west from that point."

This company's statement for October and the ten months to Oct. 31 is as follows:

	October.		Ten months.	
	1886.	1885.	1886.	188.
Miles worked...	2,418	2,397	2,417	2,38!
Earnings.....$1,687,348	$1 676,075	$12,740.023	$12,714,609	
Expenses.	667,771	666,316	6,615,366	6,669,205
Net earnings..$1,019,577	$1,009,759	$6,124,657	$6,045 404	

For the ten months the gross earnings increased $25,414, or 0 2 per cent., and the expenses decreased $53,839, or 0.8 per cent., the result being a gain of $79,253, or 1.3 per cent., in the net earnings.

Baltimore & Ohio.—The connection with the Philadelphia & Reading tracks in Philadelphia was completed on Dec. 7, and it is announced that through trains will be run between Baltimore and New York on Dec. 13 for the first time.

Beech Creek.—The Northern Central Co. has filed its answer in the suit brought to prevent completion of the purchase of this road. The defendant denies that the Beech Creek is a competing line, and that there could be no competition between the two roads as they are not parallel in any part of their length.

This company is about to build a branch about 6 miles long from Ansonville, in Clearfield Co., Pa., to Irvona, on the Cresson, Clearfield & New York road. This branch will make a cross connection through the Cresson road with the Pennsylvania railroad.

Boston & Maine.—At the annual meeting in Boston, Dec. 8, it was unanimously voted to accept the legislative act granting the road the right to build a union station on the northern side of Boston in connection with other roads entering the city from that direction. The directors were authorized to issue improvement bonds from time to time as needed.

This company has decided to add to its equipment 10 drawing-room cars, 15 first-class passenger cars and 300 freight cars.

Canadian Pacific.—This company's statement of earnings and expenses for October and the ten months to Oct. 31 is as follows:

	October.	Ten months.
Gross earnings. $1,077,630		$8,114,417
Working expenses.....	60 ,683	5,139 412
Net profits	$467.947	$2,975,005

"The gain in net profits over the same period last year is for October $75,149; and from Jan. 1 to Oct. 31 it is 3292,-815.

"The gross earnings for October include $42,943 for the carriage of the construction material, as against $85,000 during the same month last year, but as it was carried at absolute cost, the net result is not affected."

Central, of New Jersey.—Messrs. John S. Kennedy and Joseph S. Harris, Receivers of the Central Railroad Co., of New Jersey, have decided to take possession of the company's lines on Jan. 1, 1887, and they have sent a formal notice to that effect to the Receivers of the Philadelphia & Reading Co. In taking possession of the lines, it is stated that the Receivers expect to maintain harmonious relations with the Reading management, and business will be done under old traffic agreements which are still in force.

Champaign, Havana & Western.—It is reported that this road, which was recently sold at foreclosure and bought by the bondholders, has been by them sold to the Illinois Central Co. No particulars in relation to this report can be ascertained.

Chicago, Burlington & Quincy.—The statement for October and the ten months to Oct. 31 is as follows:

	October.		Ten months.	
	1886.	1885.	1886.	1885.
Passenger	$581,398	$568,285	$4,791,294	$4.415.957
Freight	2.063.353	2,183,617	15,991.957	16.166,060
Mail and mis....	132,023	116,356	1,390 386	1,326,380
Total... .....$2,776.774	$2,858,258	$ 2,103,637	$21,908,397	
Expenses	1,207,830	1,190,648	11, 99,018	11.791,052
Net earnings..$1 568,944	$1,667,610	$10,704,619	$10,117,345	

For the ten months the gross earnings increased $195,240, or 0.9 per cent., and the expenses decreased $392,034, or 3.3 per cent., the result being a gain of $587,274, or 5.8 per cent in the net earnings.

Chicago & Indiana Coal.—The extension of this road from Fair Oaks, Ind., the present northern terminus, to La Crosse is now all graded. Track laying was begun last week and the rails are reported down for 7 miles from Fair Oaks. Tracklaying will also be begun on the northern end this week, and the work will be pushed as fast as possible. The extension will be about 40 miles long and will give the road a connection with the Chicago & West Michigan and other lines.

Chicago, Kansas & Western.—Engineers are reported as busily engaged at several points surveying the line of this projected road between Chicago and the Mississippi River.

Chicago, Milwaukee & St. Paul.—Work on the Kansas City Extension is bein gpushed as fast as the weather will permit, and the grading is now completed for 95 miles southwest from Ottumwa, Ia. The track is laid for 30 miles, and would have been completed further but for delay in delivering ties. Work has been commenced on the bridge over the Missouri near Kansas City, and grading will soon be begun from that point northeast.

Chicago & Northwestern.—The extension of this company's Dakota Central line, from Doland, Dak., to Verdon, in Brown County, a distance of 24½ miles, was opened for business Dec 1.

Chicago, Rock Island & Pacific.—On this company's extension, the Chicago, Kansas & Nebraska line, trains have begun to run regularly from St. Joseph, Mo., westward to Horton, Kansas, a distance of 40 miles. The line from Horton northwest is graded as far as Fairbory, Neb., with tracklaying in progress. On the Kansas line the grading is finished from Horton to Topeka, and track laid 7 miles, but tracklaying on that line has been somewhat delayed by cold andstormy weather. Grading is in progress beyond Topeka towards Hutchinson.

Chicago & St. Louis.—It is reported that this road has been sold to the Atchison, Topeka & Santa Fe Co., as noted elsewhere.

Chicago & Southeastern.—This company has filed articles of incorporation to build a railroad from Chicago to the Indiana line in Thornton townships with spurs and branches connecting the other roads.

Cincinnati, Hamilton & Dayton.—A new call has been issued for a special meeting, to be held in Cincinnati, Jan. 5 next, to vote upon a new proposition, which is substituted for the former one for the issue of preferred stock. The new plan is to issue $500,000 additional common stock and $2,000,000 in 4½ per cent. bonds; proceeds to be used for additional equipment and additional terminal facilities in Toledo and Cincinnati.

Cleveland, Columbus, Cincinnati & Indianapolis.—The earnings, expenses, etc., have been as follows:

	September.		Nine months.	
	1886.	1885.	1886.	1885.
Gross earnings..... ..	$442,955	$360,208	$3,018,852	$2,632,271
Operating expenses.	233,641	228,008	1,925.934	2.011,297
Net earnings.....	$209,314	$132,200	$1,092,917	$620 974
Interest, taxes, etc..	69,062	81,927	621,607	617.646
Balance.	$140,251	$50,273	$471,310	$3,328

Additions to property this year were $10,988 in September and $154,596 for the nine months, leaving a balance of $129,-263 for September and of $316,714 for the nine months.

Colorado Midland.—Tracklaying was recently begun on this road, and on Dec. 1 three miles of track had been laid on the main line from Colorado Springs, Col., westward.

Covington & Macon.—This company reports grading completed for 60 miles from Macon, Ga., and track laid on it 30 miles, and the work is being pushed steadily forward. The company expects to have the line completed to Athens, Ga., by March next if the present rate of progress is continued.

Cresson, Clearfield & New York.—At a recent meeting of the directors of this company it was decided to build a branch from Asheville, in Cumberland County, Pa., along the Chestnut Valley, to Mahaffey, on the Clearfield & Jefferson road. This branch would be 31 miles long and would develop a large tract of coal land.

Duluth, South Shore & Atlantic.—Brown, Howard & Co., the contractors for this line, have sublet the extension from Sage, Mich., on the Detroit, Mackinac & Marquette, to Rexford Brothers & Hodge, of New York, who are to do the grading and bridging and supply the ties. The contractors are already arranging to begin work.

On the Western Division no contracts have been let yet and none will be let until the work of locating is completed.

Eastern.—At the annual meeting in Boston, Dec. 8, a resolution was adopted "that the stockholders reaffirm their acceptance of the act of the Legislature of Massachusetts authorizing the issue of preferred stock in exchange for certificates of indebtedness, and confirm and ratify the action of the directors in issuing said preferred stock in pursuance of said act."

East Tennessee, Virginia & Georgia.—It is reported that a majority of the preferred stock of this company has been bought by a syndicate acting in the interest of the Norfolk & Western Road, and that their object is to arrange for a lease of the East Tennessee line to the Norfolk & Western Co.

Fremont, Elkhorn & Missouri Valley.—This company's branch from Scribner, Dak., westward was opened for traffic, on Dec. 6, to Lindsay, 62 miles westward from Scribner and 124 miles from Missouri Valley. The stations on the new branch with the distance from Scribner are Snyder, 6.9; Dodge, 12.1; Howell, 20.7; Clarkson, 27.7; Leigh, 35.2; Creston, 42.5; Brookfield, 49.2; Cornelea, 54.9; Lindsay, 62 miles.

Georgia Midland & Gulf.—The engineers who are surveying the proposed extension of this road have completed their work from Columbus southwest to Dawson, Ga., and are running the line south of that place.

Georgia Railroad Charters.—A number of applications for new charters are before the Georgia Legislature. Three of these have already passed the Legislature—the Atlanta, Mississippi & Atlantic, to run from Atlanta east to Augusta and west to some point on the Memphis & Charleston; the Atlanta & Hawkinsville, to run from Atlanta to Hawkinsville, Ga.; and the Georgia, Carolina & Northern, to run from Atlanta to Columbia, S. C. Bills are now before the Legislature to charter the Asheville & Atlanta, to run from Atlanta to Asheville, N. C.; the Atlanta & Alabama, to run from Atlanta to Selma, Ala.; and to authorize the Macon & Covington road to build to Atlanta as well as to Athens.

Hudson River Tunnel.—It is stated that this company has made arrangements to resume work on its tunnel under the Hudson River. The pumps have been put to work pumping the water out of the old tunnel, and as soon as this is completed a careful examination will be made of the condition of the work already done, further steps depending somewhat upon the results of this examination.

Indianapolis, Decatur & Springfield.—It is stated that parties interested in this road have recently purchased the Quincy, Missouri & Pacific road, formerly part of the Wabash system, and now in operation from Quincy, Ill., west to Trenton, Mo., 136 miles. The object, it is said, is to extend the Indianapolis, Decatur & Springfield line from Decatur to Quincy, Ill., about 150 miles, and then extend the Quincy, Missouri & Pacific from Trenton west 26 miles to Marysville, on the Council Bluffs line of the Wabash road. This would complete a new line from Indianapolis to Omaha, about 610 miles long.

Kansas City, Memphis & Birmingham.—On this company's Memphis, Birmingham & Atlantic line passenger and freight trains began to run to New Albany, Miss., Dec. 4. Heretofore they have only run as far as Holly Springs. A correspondent writes: "We are having some very severe weather down here, the coldest ever known in this section; thermometer has been in the neighborhood of zero for the last three days, with no signs of a change for the better."

Kansas, Nebraska & Dakota.—On Dec. 3 this road was completed to Topeka, Kan., 130½ miles northwest from the starting point at Fort Scott. Regular trains between Fort Scott and Topeka begin running this week.

Lafourche, Assumption & Ascension.—This company has been organized to build a railroad from Napoleonville, La., along Bayou Lafourche, a distance of 15 miles. It is intended to accommodate a local business.

Lakeside & Marblehead.—Work is in progress on the construction of this road, and it is expected that it will be completed about the close of the year. It is to run from a point on the Lake Shore road, near Danbury, O., to Marblehead, a distance of 8 miles. It will be used to carry the freight of the large lime kilns around Marblehead, and is also expected to have a good deal of excursion business in the summer.

Little Rock, Mississippi River & Texas.—It is stated that Mr. E. H. Winchester, of Portsmouth, N. H., has sold his large holdings of bonds of this road to Mr. Jay Gould, who, with this purchase added to his previous holdings, now controls a majority of the bonds and will consequently be able to reorganize the road in the Missouri Pacific interest.

Louisville & Nashville.—The gross and net earnings have been as follows:

	Gross earnings.		Net earnings.	
	1886.	1885.	1886.	1885
July.....	$1.259,774	$1,057 991	$546 453	$361 605
August..... ...	1.200,567	1 078,146	505,340	490 612
September.....	1,258 191	1,148,214	526,574	464 653
October....	1,383 753	1.263,469	581,404	544,190
Total 4 mos...$5,102.285	$4 547,820	$2,159,771	$1,771,060	

Amount paid for construction in same period in 1886, $137,119; in 1885, $105,819.

Louisville, New Orleans & Texas.—This company has filed a second-mortgage on its property to the Union Trust Co., of New York, for $7,899,000, and has had this second mortgage recorded.

Midland, of Indiana.—Tracklaying on the extension of this road has been resumed. All the rails are on hand, and it is expected that the road will be completed in a short time.

Minneapolis & Pacific.—Track is now reported laid on this road, and mixed trains are running from Minneapolis, Minn., to Lowry, a distance of 129½ miles, and from Elbow Lake, Minn., to Lidgerwood, Dak., a distance of 57½ miles. There remain to be completed 7½ miles from Lidgerwood west to Ransom, Dak., and the gap of 31 miles between Lowry and Red Lake, on which tracklaying is now in progress.

Missouri, Iowa & Nebraska.—This road was formally transferred to the Keokuk & Western Railroad Co., organized by the bondholders who purchased the line at foreclosure sale on Dec. 3. The new company will hereafter control and operate the new line.

Missouri Pacific.—Surveys have lately been made for an extension of this company's International & Great Northern line from its present terminus at Longview, Texas, northward to a connection with the St. Louis, Iron Mountain & Southern at Texarkana. The distance is about 80 miles.

Morris County.—Grading on this road is now nearly completed and tracklaying is in progress. The new road will be 17 miles in length, extending from Charlotteburg, N. J., on the New York, Susquehanna & Western, to Port Oram. Included in this is the 4 miles of the Charlotteburg & Green Lake roads, which were purchased by the new company. The road runs through an iron district in which there are many mines already worked and others which will be opened as soon as they are provided with transportation facilities.

Newport News & Mississippi Valley Co.—The October statement of this company is as follows:

	Gross earnings.		Net earnings.	
	1886.	1885.	1886	1885.
Ches. & Ohio..... .	$37 .031	$307,476	$128,780	$108.768
E., L. & B. S....	90,673	70,632	33,481	33,038
C., O. & S. W.....	181,436	163,106	84,122	67,441
Total...	$644.140	$541.474	$245,983	$209,247

The total earnings show an increase of $102,666 (19 per cent.) gross, and $36,736 (18 per cent.) net.

New York & New England.—The statement for October, the first month of the fiscal year, is as follows:

	1886.	1885.	Increase	P. c.
Earnings	$381,180	$339,963	$41.217	12.1
Expenses.....	222,671	189,258	33,413	17.7
Net earnings.....	$158,509	$150,705	$7,804	5 2

The Boston *Advertiser* of Dec. 7 says: "The contest in New York & New England is still anybody's fight. The stock register is now ready for the annual election, and shows of the common stock 44,230 shares are registered in Boston and 1- 2,250 shares in New York.

"Owing to the extent to which the capital stock is in the hands of brokers representing interests which are by no means identical, it is not in the power of anybody as yet to determine what the result of the election will be. There seems to be four distinct parties among the present shareholders, as follows:

"1. The people who are identified with the Wilson management which was superseded in 1883. There has been large and active buying of the stock by this party, and they now hold perhaps 60,000 shares.

"2. The people interested in the Danbury project, whose holdings are estimated at from 30,000 to 40,000 shares.

"3. Speculators who are not identified with any other party and are believed to hold the balance of power. The aggregate stock carried by the people who may be classed under this head is not less than 50,000 shares.

"4. The old stockholders, comprising most of those owners of New York & New England shares who have not parted with their stock under the recent temptation of high prices.

"For the sake of clearness I will call the first-named the 'Jonas H. French party'; the second the 'Danbury party'; the third the 'Speculators' party'; and the fourth the 'Clark-Higginson party.'

"A fifth party might be added in the person of Mr. Cyrus W. Field, who can have a big block of stock for voting purposes a week from to-day if he desires it.

"If the speculators who are not identified with either the Danbury or the French parties decide to support the present board of directors in full, the latter will probably have a majority. President Clark and his friends will probably fight

hard for the retention of Mr. Higginson, and the French party may be expected to manifest equal determination that Mr. Higginson shall go.

"The course of the speculators is likely to be determined by calculation as to the immediate speculative effect of a change of management. If such a change could be accompanied by the announcement of some scheme of consolidation or lease, which would fire the public imagination and enable the speculators to unload at higher prices, then they would be perfectly willing to assist in a radical change of management. But if the change is not to be accompanied by an immediate bull point of large proportions, then the speculators would naturally favor the retention of Mr. Clark as president, upon the theory that his defeat would cause free selling of the stock, unless some strong party stepped forward to sustain it.

"A compromise which shall continue Mr. Clark as president, with some radical changes in the board of directors, is not improbable. * *

"A considerable portion of the present holders of stock are in favor of adding Mr. Elijah Smith to the present board of New York & New England directors."

New York, Philadelphia & Norfolk.—The latest report concerning this company's projected line southward is that the company, or persons largely interested in it, is negotiating for the use of the Seaboard Air Line from Norfolk to Charlotte, N. C., and that a line will be built from some point on the Carolina Central to Columbia, S. C., and thence to Atlanta, Ga. This is simply rumor and nothing official has been given out in any way concerning it.

New York, Woodhaven & Rockaway.—The stockholders have decided to reorganize the company and to extend the road. A proposition was agreed to that stock amounting to $1,000,000 be assessed 5 per cent., and income bonds to the amount of $1,000,000, 10 per cent., and that the first-mortgage bonds be increased from $600,000 bearing 6 per cent. interest to $1,000,000 bearing 5 per cent., the money from the assessments to be used in the purchase of the Rockaway Branch of the Long Island Road, and to connect it by 2¼ miles of new road with the New York, Woodhaven & Rockaway Road.

Norfolk & Western.—It is reported that this company, or persons largely interested in it, have bought a majority of the stock of the East Tennessee, Virginia & Georgia Co. for the purpose of controlling that road. The purchase, it is said, is of first preferred stock at about par. The second preferred stock and common stock of the East Tennessee Co. have no votes at present. The report is that the East Tennessee road will be leased to this company and operated by it. This would give the Norfolk & Western complete control of a line from Norfolk to Atlanta and Memphis, which it could doubtless operate to advantage.

Northern Pacific.—Track on the Duluth & Manitoba Branch is now laid to Red Lake Falls, Minn., 70 miles northward from the junction with the main line at Hawley, and trains have begun to run through.

On the western end of the Cascade Division track is now laid for 61 miles from Tacoma, Wash. Ter., and the grading is finished for 9 miles further. On the remaining 10 miles to the west end of the great tunnel there is some very heavy work, but it is well advanced and will, it is expected, be finished in January. On the eastern end of the division track is now laid for 35 miles west of Ellensburg, leaving only 5 miles to reach the tunnel. The grading on the switch-back, which is to be used until the tunnel is completed, is nearly all finished and is to be entirely completed in January, when the track laying will be begun. If the weather permits trains will run through over the Cascade Division early in the year.

Ogdensburg & Lake Champlain.—The New York Supreme Court at General Term has confirmed the decision of the lower courts, enjoining this company from paying any more interest on the bonds of the Lamoille Valley Extension Co., under the guarantee. The suit was brought by the income bondholders, who claimed that the guarantee was illegal as it created a lien upon the earnings of the Ogdensburg & Lake Champlain Co. prior to theirs. This decision is now sustained by the court.

Ohio River.—The track on the extension of this road from Parkersburg to Point Pleasant, Va., is now completed from Point Pleasant northward, up the Ohio River, to a point within 8 miles of Parkersburg. The bridge over the Kanawha at that point is nearly completed and it is expected that the tracklaying will be finished in a very short time. As soon as it is completed trains will be run through from Wheeling to Charleston over this road and the Kanawha & Ohio.

Oregon Railway & Navigation Co.—The contract for building repair shops for this company at Albina, opposite Portland, Ore., has been let to Langford & Bridges, of Portland, who are to begin work at once. The shops will be owned by the Northern Pacific Terminal Co. and will be used by the Northern Pacific as well as by this company, although they are intended principally for the Oregon Railway & Navigation line.

Pennsylvania.—Surveys have been made for a branch of this company's Tyrone Division, from Madeira, Pa., to Irvona, a distance of 8 miles. This branch would connect with the Cresson & Clearfield road, and will also connect with the Beech Creek road, through a branch to be built by that company, making a much better line for coal from certain parts of Clearfield Division than now exists.

The total disbursements of the Pennsylvania Railroad Relief Department for the month of October were $10,432, as follows: For death benefits, $5,500; accidents, $1,603; sickness, $3,329.

Piedmont & Cumberland.—The grading on this road is now very nearly completed, the only work of any importance remaining being a rock cut about 300 ft. long, which it is thought can hardly be finished before Jan. 1. Track has been laid from Piedmont to Keyser, 5 miles, and 7 miles of track have also been laid at other points, leaving about 17 miles to be put down. The road is an extension of the West Virginia Central & Pittsburgh and is controlled by that company.

Pittsburgh & Western.—The United States Circuit Court in Pittsburgh has made an order authorizing the receivers and the company to complete the lease of the Pittsburgh, Painesville & Fairport road, arrangements for which were made some time ago.

Prescott & Arizona Central.—This company announces the opening of its road from Prescott Junction, on the Atlantic & Pacific road, southward to Prescott, the capitol of the territory, a distance of 72 miles. Trains began to run through Dec. 1.

Pueblo & Eastern.—This company has been organized to build a railroad from Pueblo, Col., eastward to the Kansas line, with a branch to Kit Carson. The principal office of the road will be at Pueblo. At the Kansas line connection will be made with a road to be built in that State.

Richmond & Danville.—The stockholders of the Charlotte, Columbia & Augusta and the Columbia & Greenville railroad companies met in Columbia, S. C., Dec. 2 and confirmed the leases of both of these roads to the Richmond & Danville Co. A protest against the Charlotte, Columbia & Augusta lease was filed by some of the stockholders.

At the annual meeting in Richmond, Va., Dec. 8, the lease of the Washington, Ohio & Western road was approved. The election of directors was deferred until Dec. 16, to which date the meeting adjourned.

Sanford & Indian River.—This line is now completed to Lake Charm, Fla., 1 mile beyond the late terminus at Oviedo, and 18½ miles from Sanford. The road is controlled by the Savannah, Florida & Western and is operated in connection with the South Florida Railroad.

Savannah Valley.—The stockholders of this company met in Anderson, S. C., Dec. 3, and ratified the consolidation of the company with the Port Royal & Western Carolina companies, which now includes all the lines controlled by the Central Railroad Co., of Georgia, in South Carolina.

Securities on the New York Stock Exchange.—The Governing Committee has placed the following securities on the lists:

Chicago, Burlington & Northern, $2,250,000 debenture bonds.

Columbus, Hocking Valley & Toledo, $1,000,000 additional 6 per cent. general mortgage bonds.

East Tennessee, Virginia & Georgia, $22,000 additional 5 per cent. divisional bonds.

Gulf, Colorado & Santa Fe, $600,000 additional first-mortgage bonds.

Silver Springs, Ocala & Gulf.—This road has been opened to Leroy, Fla., 4 miles southward from the late ternus at Cotton Plant and 15 miles from Ocala.

Summerville & St. Johns.—This road, which is to run from Summerville, S. C., to the Santee River, has track laid from Summerville southward 8 miles, and the grading is nearly done to Long Ridge, 2 miles further. It is built chiefly as a logging road.

Syracuse & Baldwinsville.—Tracklaying is now completed on this road, and it is announced that it will be opened for business about Dec. 15. It extends from Syracuse, N. Y., to Baldwinsville, a distance of 12 miles.

Tennessee Valley.—This company has been organized at Memphis, Tenn., for the purpose of building a railroad from St. Joseph, Tenn., to Florence, Ala., to connect with the Sheffield & Birmingham road. The line is intended to develop the iron district of Wayne County, Tennessee.

Texas, Santa Fe & Northern.—Trains are reported as beginning to run on this road, which extends from Santa Fe, N. M., northward to Espanola, a distance of 38 miles. At Espanola a connection is made with the New Mexican Division of the Denver & Rio Grande road.

Toledo, Peoria & Western.—Judge Gresham, in the United States Circuit Court, has confirmed the sale of the road to Charles Moran and Thomas Denney for $4,690,000. The purchasers represent the bondholders.

Troy & Greenfield.—The Boston *Advertiser* of Dec. 6 says: "The Fitchburg Railroad is already moving in self-defense, and a few days ago proposed to the Governor and Council that a consolidation be effected between the state road and the Fitchburg, under the act approved June 5, 1885. This act provided for a consolidation of either the Fitchburg, the Boston & Lowell, the Central Massachusetts, the Vermont & Massachusetts, or the New Haven & Northampton with the Troy & Greenfield & Hoosac Tunnel road, provided such consolidation shall take place within three years.

"The Boston & Lowell Co., it is understood, objects strenuously to a consolidation of the Fitchburg with the state road, urging that when the Central Massachusetts shall have been completed to Northampton, it will have a tunnel connection, and thus be in a position itself to bid for a consolidation with the state road. The directors urge that under the existing circumstances it would be an injustice toward the Boston & Lowell for the Governor and Council to consent to an immediate or early consolidation of the state road with the Fitchburg, and urge that a decision be deferred at least until the expiration of the state's contract with the Fitchburg.

"The heavy snowstorm will doubtless interfere with the construction of the extension of the Central Massachusetts which, it was hoped, would be completed to Ware by the new year, and to Northampton in the early Summer. It is probable, however, that the extension to a tunnel connection will be completed before the expiration of the Fitchburg contract, and the request of the Boston & Lowell that any consolidation of the state road with the Fitchburg be deferred until after that date was doubtless made with that end in view.

"The subject was referred by the Governor and Council to counselors Coffin and Powers for examination and recommendation. Their report will be awaited with no little interest.

Union Pacific.—The statement for October and the ten months to Oct. 31 is as follows:

	October.		Ten months.	
	1886.	1885.	1886.	1885.
Earnings	$2,755,154	$2,714,608	$21,908,823	$20,989,351
Expenses	1,573,589	1,408,388	14,582,017	13,229,023
Net earnings	$1,181,565	$1,306,220	$7,326,806	$7,760,328

Expenses include taxes. For the three months the gross earnings increased $919,472, or 4.4 per cent., and the expenses $1,352,994, or 10.3 per cent., the result being a decrease of $433,522, or 5.6 per cent in the net earnings.

Wabash, St. Louis & Pacific.—A Chicago dispatch of Dec. 7 says: "Judge Gresham, in the United States Circuit Court for the Northern District of Illinois, to-day gave a decision in the Wabash receivership case. In the course of his opinion he was very severe upon the receivers and the methods they had employed in the management of the system, as well as upon various other prominent owners of the road.

"Judge Gresham gave a very long review of the entire litigation respecting the Wabash road, from the time the Receivers were appointed, in 1884, to date, together with the lease by the Wabash Co. to the St. Louis & Iron Mountain Co. He said: 'Beers, in behalf of himself and other bondholders of the same class, filed a bill to foreclose the mortgage on the Chicago Division to secure an issue of bonds amounting to $4,500,000, the bill being filed upon the theory that all the railway property in this state was taken into the custody of this Court. The mortgages of 1867 and 1879, and the Chicago Division mortgage, and 10 others, secure outstanding bonds amounting to over $27,000,000, upon which nearly 2½ years' interest is due. The interest in arrears was about $4,400,000 in August last. The validity of the 13 mortgages is not denied. The income arising from the operation of the lines east of the Mississippi River was pledged by the mortgagees. The main line, including the Chicago Division, made in 1885, over and above operating expenses, $873,925, which left, after making a fair deduction for taxes, over $600,000. This money was used in paying losses on non-remunerative lines in the system. In the two suits which have been brought here, the Court is asked to remove Humphreys and Tutt on the ground that they are not fit persons to act as Receivers, and to appoint some capable, trustworthy person in their place.'

"Judge Gresham severely criticised the procedure under which the Receivers were appointed. Their appointment was originally made by the Court in Missouri, on the application of the company itself. Judge Gresham said: "It was claimed that the Missouri Pacific was not able to operate the Wabash lines at a profit, and, May 19, 1884, under a clause in the lease, notice was given to the Wabash Co. that the lessee had sustained loss in the operation of about $4,000,000. The Wabash Co. at this time had outstanding paper representing floating indebtedness amounting to $3,000,000 or more. Solon Humphreys, Jay Gould, Sidney Dillon and Russell Sage were liable as indorsers on all this paper. All, with the exception, perhaps, of Humphreys, were stockholders and Directors in the Missouri Pacific or the Iron Mountain Co., and all, including Humphreys, were interested in the last-named corporation or as indorsers on the outstanding notes. They resolved that steps should at once be taken to secure the appointment of a Receiver, and a bill was filed in St. Louis. This bill avowed that the Wabash lines were then operated under the lease to the Iron Mountain Co. On May 30 the Wabash Co. filed its petition, representing that its promissory notes, amounting to about $2,300,000, were outstanding, some of which would soon mature; that these notes were indorsed by sundry individuals of high credit and financial standing. The name of Solon Humphreys, said Judge Gresham, was disclosed as one of the indorsers, but the names of Gould, Dillon and Sage, the other indorsers, were withheld, 'because of the personal inconvenience and injury which might result to them from the publicity thereby given to their business affairs.'

"Judge Gresham then spoke of the way the floating indebtedness had been held over the bondholders' heads to force them to agree to the plans of the Purchasing Committee. After referring to the explanation made by counsel on this point, Judge Gresham said: 'The boldness of this scheme to aid the purchasers by denying equal rights to all bondholders secured by the same mortgages is equaled only by its injustice. The right is asserted by the purchasers of the property, in a court of equity, to take the earnings of a road covered by a mortgage and pay part of the coupons secured by that mortgage to the exclusion of coupons secured by the same mortgage and falling due at the same time.' Alluding to the plea that the purchasers bought the property without being fully informed as to its value, Judge Gresham says: 'It is safe to say that no one knew better at or before the sale the value of the Wabash property than the four indorsers and others represented by the Purchasing Committee.' Touching upon another serious charge against the Receivers Judge Gresham said: 'The mines and other property of the Ellsworth Coal Co. are adjacent to the Wabash Railway. The original stock of this company was $24,000, which was increased in June, 1885, to $67,500. Humphreys, Gould, Dillon, Sage, Hopkins and Charles Ridgeley, all directors in the Wabash Co., were stockholders in the coal company.' Then, speaking of the Receivers' purchases of coal of this company, he said: 'There is evidence tending to show that the price for the coal purchased for use was too high and that the freight upon the coal shipped was too low. The relation which these two corporations sustained to each other exposed the owners of the stock and directors of the coal company to the suspicion of intending to benefit that company at the expense of the Wabash Co.

"Judge Gresham decided that he had jurisdiction for the reason that the bulk of the property covered by the mortgages in question was chiefly in this district and that a proper showing had been made on behalf of the mortgages for which foreclosure was asked. He held that they should be foreclosed and the present receivers removed. Leave was therefore given to the mortgage bondholders of 1862 and 1879 to file a bill in the United States District Court at Springfield asking for a receiver for the property. It was held that the application for the appointment of a receiver for the Chicago Division of the system could be filed here and would be entertained. They were, it was held, entitled to such receiver, and their case from the showing made was good."

Western Union Telegraph.—The following statement is made for the quarter ending Dec. 31:

Estimated net earnings	$1 000,000
Interest and sinking funds	143,470
Surplus for the quarter	$856,530
Surplus, Oct. 1	5,324,262
Total surplus	$6,180,792

The board resolved to declare no dividend for the quarter.

Wilmington, Chadbourne & Conwayboro.—This road, which was originally started as a lumber line, which was subsequently opened for general business, is now completed and in operation to Loris, S. C., 6½ miles southward from the late terminus at Mt. Tabor, and 20 miles from the junction with the Charlotte, Columbia & Augusta at Chadbourne.

Wrightsville & Tennille.—The company formed by the consolidation of the Wrightsville & Tennille and the Dublin & Wrightsville companies will retain the name of the Wrightsville & Tennille Railroad Co. The line has been completed to Dublin, Ga., 35 miles from Tennille, and last week trains began to run through to Dublin, connecting at that place with steamboats on the Oconee River.

ANNUAL REPORTS

The following is an index to the annual reports of railroad companies which have been reviewed in previous numbers of the current volume of the *Railroad Gazette:*

	Page.		Page.
Alabama Great Southern	423	Louisiana Western	770
Alabama R. R. Commission	788	Louisville & Nashville	695, 714
Ala., N. O., Tex. & Pac. Junc.	423	Louisville, N. Albany & Chi.	255
Allegheny Valley	588	Maine Central	68
Alliance, Niles & Ash	651	Manchester & Lawrence	414
Americus, Preston & Lump	492	Manhattan	786
Ashtabula & Pitt-burgh	652	Marquette, Houghton & Ont	414
Atchison, Top. & Santa Fe	292	Massillon & Cleveland	651
Atlanta & West Point	554	Memphis & Charleston	570
Atlantic & N. Carolina	485	Mexican Central	486
Atlantic & Pacific	594	Michigan Central	23, 313
Baltimore & Ohio	805	Michigan & Ohio	588
B. & O. Employes' Relief Ass'n.	345	Mil., Lake Shore & Western	191
Baltimore & Philadelphia	15	Minnesota & Northwestern	518
Bay View, L. Trav. & Mackin.	652	Mississippi & Tennessee	120
Boston & Albany	750	Missouri, Kansas & Texas	366
Boston & Lowell	15	Missouri Pacific	366
Boston & Maine	23, 841	Mobile & Girard	492
Boston & Providence	15, 805	Montpelier & Wells River	493
Boston, Revere Beach & Lynn	769	Morgan's La. & Texas	770
Bridgton & Saco River	826	Nashua & Lowell	414
Buffalo, N. Y. & Philadelphia	16	Nashville, Chatta. & St. L.	584, 698
Bur., Cedar Rapids & No.	622	Natchez, Jackson & Col.	104
Cairo, Vincennes & Chicago	536	Naugatuck	26, 826
Camden & Atlantic	518	New Brighton & New Castle	651
Canadian Gov't Railroads	272	New Castle & Beaver Valley	651
Canadian Pacific	393	New Haven & Northampton	208
Carolina Central	360	New London Northern	120, 826
Central, of Georgia	806	New Orleans & Northeast	429
Central Pacific	469	N. Y. Central & Hudson River	698
Central Vermont	734	N. Y., Chicago & St. L	636
Charlotte, Col. & Augusta	155	N. Y., Lake Erie & Western	841

Chartiers	594	N. Y. & New England	16,786
Chesapeake & Dela. Canal	414	N. Y., N. Haven & Hartford	23
Chesapeake & Ohio	240	N. Y., Ontario & Western	86, 826
Chesapeake, Ohio & S. W	734	N. Y., Penna. & Ohio	842
Cheshire	104	N. Y., Providence & Boston	25
Chicago & Alton	156	N. Y. Railroad Commission	33
Chi., Burlington & Quincy	292, 308	N. Y., Susquehanna & Wes.	139 554
Chi. & Eastern Illinois	714	N. Y., West Shore & Buffalo	58
Chi. & Grand Trunk	324, 709	Norfolk & Western	104, 535
Chi., Milwaukee & St. P	208, 224	Northern Central	156
Chi. & Northwestern	414, 535	Northern Pacific	570, 665
Chi., Rock Island & Pac.	393, 423	Norwich & Worcester	120
Chi., St. P., Minn. & Omaha	256	Northeastern (South Carolina)	16
Chi., St. L. & Pittsburgh	324	Northern (New Hampshire)	414
Chi. & Western Indiana	485	Northwestern Ohio	632
Chi. & West Michigan	595	Ogdensburg & L. Champlain	551
Cin. & Eastern	626	Ohio & Mississippi	174, 750
Cin., Hamilton & Dayton	485	Old Colony	709
Cin., Ind., St. L & Chi.	588, 714	Oregon Improvement Co.	698
Cin. & Muskingum Valley	394, 652	Oregon Ry. & Nav. Co.	505, 525
Cin., N. Orleans & Tex. Pacific	140	Oregon & Transcontinental Co.	533
Cin., Richmond & Ft. Wayne	652	Pacific Mail Steamship Co.	518
Cin. & Springfield	208	Panama	307
Cin., Wash. & Baltimore	518	Pennsylvania Company	651
Cleve., Akron & Col	636	Pennsylvania & New York	222
Cleveland & Canton	192	Pennsylvania Railroad	174
Cleve., Col., Cin. & Ind.	208	Peoria, Decatur & Evansville	195
Cleve., Lorain & Wheeling	588	Philadelphia & Reading	48
Cleve. & Pittsburgh	652	Phila., Wil. & Baltimore	307
Cleve., Youngstown & Pitts.	622	Pittsburgh, Cin. & St. L.	394
Columbia & Greenville	174	Pittsburgh, Cleve. & Toledo	698
Col., Hocking Vy. & Tol.	192, 360	Pittsburgh, Ft. Wayne & Chi.	651
Columbus & Rome	770	Pittsburgh & Lake Erie	68
Concord	367	Pittsburgh Junction	85
Conn. & Passumpsic Rivers	688	Pitts., McK. Youghiogheny	68
Connecticut River	85	Pitts., Wheeling & Ky.	394
Consolidation Coal Co.	139	Portland & Ogdensburg	120
Cumberland Valley	307	Providence & Worcester	120
Del. & Hudson Canal Co	256	Pullman's Palace Car Co.	750
Del., Lacka. & Western	104, 156	Richmond & Alleghany	86
Denver & Rio Grande	139, 536	Richmond & Danville	85
Denver & Rio Gr. Western	694	Richmond, Fred. & Potomac	86
Des Moines & Fort Dodge	291	Rochester & Pittsburgh	86
Detroit, Lansing & No.	323	Rome, Wat. & Ogdensburg	85
Detroit, Gd. Ha. & Mil.	324, 518, 769	Rutland	493
Dublin & Wrightsville	255	St. Jo. & Grand Island	734
East St. L. & Carondelet	651	St. L., Alton & Terre Haute	588
East Tennessee, Va. & Ga.	595, 622	St. L., Iron Mt. & So.	307
Eliz., Lex. & Big Sandy	734	St. L. & San Francisco, 192, 243,	360
Erie & Pittsburgh	651	St. L., Van. & Terre Haute	292
Evansville & Terre Haute	734	St. Paul & Duluth	155
Fitchburg	68	St. P., Minn. & Manitoba	594, 682
Flint & Pere Marquette	570	Sandy River	826
Fort Wayne, Cin. & Louisv.	307	Savannah, Fla. & Western	344
Fremont, Elkhorn & Mo. Vy.	535	Scioto Valley	587
Galveston, Har. & San Antonio	770	Shenandoah Valley	570
Galveston, Houston & Hen.	367	Sioux City & Pacific	535
Georgia Pacific	272	South Carolina	208, 308
Georg a Railroad	714	Southern Pacific (Cal.)	636
Georgia R. R. Commission	751	Southern Pacific Co.	470
Grand Rapids & Indiana	652	Sou. Ry. & Steamship Ass'n.	537
Grand Trunk	324, 709	Stewartstown	393
Gulf, Colorado & Santa Fe	454	Terre Haute & Indianapolis	470
Hanover Junc, Han. & Gett'g.	414	Terre Haute & Logansport	470
Housatonic	192	Texas & New Orleans	770
Houston & Texas Central	272	Tol., Ann Arbor & N. Mich.	621
Huntingdon & Broad Top Mt.	120	Traverse City	652
Illinois Central	174	Troy & Greenfield	223
Indiana, Bloom. & Western	750	Union Pacific	239, 665
Indianapolis & St. Louis	208	Utica & Black River	272
Indianapolis & Vincennes	652	Valley (Virginia)	826
International & Gt. No.	367	Vicksburg & Meridian	622
Iron	493	Vicksburg, Shreveport & P.	423
Jeff., Madison & Indianapolis	652	Virginia Midland	139
Kans. City, Ft. Scott & Gulf	486	Western Maryland	139
Kans. City, Springfield & Mem	485	Western North Carolina	192
Kansas City Union Depot Co.	256	Western Union Telegraph Co.	714
Kentucky Central	770	West Jersey	622
Lake Shore & Mich. So.	23, 323, 314	Wheeling & Lake Erie	698
Lawrence	651	Wilmington, Col. & Augusta	104
Lehigh Coal & Navigation Co.	140	Wilmington & Northern	652
Lehigh Valley	68, 224	Wilmington & Weldon	104
Leh. & Wilkes-Barre Coal Co.	139	Wisconsin Central	553
Little Miami	394	Worcester, Nashua & Roch.	196
Little Rock & Ft. Smith	505	Wrightsville & Tennille	251

Western Maryland.

This company owns a line from Baltimore to Williamsport, Md., 90 miles. It leases the Baltimore & Cumberland Valley road, from Edgemont, Md., to Shippensburg, Pa., and also leases the use of 3 miles of the Northern Central track in Baltimore; making a total of 126.6 miles worked. The report is for the year ending September 30.

The road is chiefly owned by the city of Baltimore, which has made large advances for its construction.

Since the close of the year the company has leased the Baltimore & Harrisburg road, as noted below.

The net earnings for the year were as follows:

	1885-86.	1884-85.	Inc. or Dec.	P.C.
Passengers	$256,122	$233,327	I. $12,795	5.3
Freight, express and milk	320,765	338,308	D. 17,543	5.2
Mail, etc	40,674	37,582	I. 3,092	8.1
Total	$617,561	$619,217	D. $1,656	0.3
Expenses	378,425	387,082	D. 8,657	2.2
Net earnings	$239,136	$232,135	I. $7,001	3.0
Gross earnings per mile	4,878	4,891	D. 13	0.3
Net earnings per mile	1,889	1,834	I. 55	3.0
Per cent. of expenses	61.3	62.5	D. 1.2	..

Expenses include the rental paid for the Hillen station in Baltimore.

The expenses were divided as follows:

	1885-86. Amount.	P. c.	1884-85. Amount.	P. c.
Transportation dept.	$236,829	38.4	$240,774	38.9
Machinery "	54,433	8.8	57,599	9.3
Road "	60,611	9.8	60,855	9.8
General expenses	25,552	4.3	27,854	4.5
Total	$378,425	61.3	$387,082	62.5

Expenditures for betterments included $16,528 for improvements of road, and $59,640 for new equipment; a total of $76,168 for the year.

The traffic reported is as follows:

	1885-86.	1884-85.	Inc. or Dec.	P.c
Locomotive miles	804,634	807,092	D. 2,458	0.3
Passengers carried	727,438	672,316	I. 55,122	8.2
Passenger-miles	15 946,659	14,602,158	I. 1,344,501	9.2
Tons freight carried	274,959	285,485	D. 10,526	3.7
Ton-miles	10,878,194	11,670,486	D. 792,292	6.8
Average rate:				
Per passenger-mile	1.61 cts.	1.67 cts.	D. 0.06 ct.	3.6
Per ton-mile	2.51 "	2.51 "	..	..

The passengers were classed as follows: Full fare, 244,913; two-thirds fare (clergymen), 4,558; half fare (children), 9,151; commutation and mileage, 175,894, and excursionists, 292,922; total, 727,438.

President Hood's report says: "The following are some of the unfavorable conditions experienced during the first nine months: First, the continued depression in general business; second, the serious interference with the operations of the road by the heavy snows, which not only hindered the movement of trains, but blockaded the country roads to such an extent, that for weeks teams could not reach many of the stations; third, the strikes in the coal regions, which not only caused a long suspension of the coal traffic, but doubled the cost of fuel; fourth, the interruption of navigation on the Chesapeake & Ohio Canal between Williamsport and Cumberland, which further delayed the resumption of coal shipments; fifth, the short wheat crop of 1885, which caused the large milling establishments upon competing roads to outbid the city market.

"The first, preferred second and second mortgage bonds of the company being by their provisions made payable *on or before* their ultimate date of maturity, advantage has, during the year, been taken of this feature, in connection with the low rate of interest at which the city of Baltimore, owner or guarantor of the junior mortgages and guarantor of a portion of these, could obtain the necessary money, to secure the requisite legislation, and arrange with the city to pay off all bonds and funded coupons of these first three mortgages not owned by it, by applying the proceeds from the sale of its 3½ per cent. stock, hence all the above obligations, not so exempted, have been called and will be paid off Jan. 1, which will result in a yearly reduction of nearly $50,000 in the fixed charges of the company.

"Negotiations, looking to the control of the Baltimore & Hanover, the Bachman Valley and the Hanover Junction, Hanover & Gettysburg Railroads, subsequently consolidated under the laws of Maryland and Pennsylvania as the Baltimore & Harrisburg Railway, begun in January last, resulted in this company securing possession of that property Nov. 1, last.

"Although this company had contributed to the construction of the Baltimore & Harrisburg Road under a traffic contract, by which the latter was restricted to the use of the Western Maryland as a Baltimore connection for a period of 25 years from November, 1879, it was recognized that the southern terminus of that road was too close to the northern terminus of the Green Spring Branch of the Northern Central, and the intervening country too favorable to railroad construction, for this company to permit the expiration of the traffic contract, or even its near approach, before strengthening its hold upon its B. & H. connection, hence it is believed that this of itself will be accepted as a sufficient reason for taking this step. Certainly, it should be, when the very favorable terms, under which it was acquired—practically without cost—are considered.

"Although the Baltimore & Cumberland Valley Branch of this road, extending from Edgemont through Waynesboro and Chambersburg to Shippensburg, Pa., has been completed to the latter point since October, 1881, and the Harrisburg & Potomac Railroad, extending from Bowmansdale in the Cumberland Valley, 6 miles west of Harrisburg, through Boiling Springs and Mt. Holly, was completed to Shippensburg in 1884, there has not yet been a connection established between these roads. This has been mainly due to a change in the original plans of the Harrisburg & Potomac road, by which the south side of the town was adopted as its terminus instead of the north side, to which the Baltimore & Cumberland Valley had already been completed. By this arrangement, although the Shippensburg termini of the two roads were brought within three-quarters of a mile of each other, the town and the Cumberland Valley Railroad, were interposed as obstacles to a connection. Finally, however, a satisfactory plan was devised for uniting the roads, and the work of construction, now rapidly progressing, will doubtless be completed early in December. The plans include a union passenger station at the crossing of the main street. It is believed that a considerable addition to the traffic, both of the B. & C. V. and the Main Line will result from this connection.

"A short branch line, about 3¾ miles in length, has just been completed from Mechanicstown to the Catoctin Iron Works in Frederick County. It is known as the Monocacy Valley Railroad, and is owned by parties interested in the iron works. Doubtless, it will be instrumental in materially enlarging the operations of the iron company.

"During the past year this company has paid $73,549 as tolls for the use of the tracks of the Baltimore & Potomac and the Northern Central railroads in Baltimore. For the past three years these payments aggregate $230,855. Recognizing that the present rate of charges are excessive, the Pennsylvania Railroad Co. agreed in May last to a reduction of 30 per cent. This was understood to apply to all business done after May 1, 1886, but up to this time this company has not had the advantage of the reduction. It is believed, however, that the necessary action to make it operative will not be much longer delayed."

Eastern.

This company's road is leased to the Boston & Maine Co., and its operations are included in that company's report. The statement to the Massachusetts Railroad Commission for the year ending Sept. 30 covers only the financial affairs of the company.

The general account is as follows:

Capital stock		$4,997,600
Funded debt		13,224,203
Unfunded debt		830,834
Profit and loss		702,067
Total		$19,754,704
Road and property	$16 960,000	
Stocks owned	2,942,460	
Cash and cash assets	752,244	
		19,754,704

The funded debt was diminished $433,117 during the year. The stocks owned include $1,811,500 Maine Central and $182,050 Portland & Rochester, the balance being stocks of leased lines.

The income account is as follows:

Receipts (rental)		$1,294,411
Expenses of organization	$9,859	
Interest	850,432	
		860,291
Balance, surplus for the year		$434,120

The surplus was equivalent to over 8 per cent. on the stock. The total surplus on hand at the close of the year was $702,067.

New York, Lake Erie & Western.

We published last week President King's report for the year ending Sept. 30 last, and supplement it this week by the reports of First Vice-President Felton and Third Vice-President Donaldson.

Mr. Felton's report gives the earnings and expenses as below:

NEW YORK, LAKE ERIE & WESTERN PROPER.

The earnings and expenses were as follows:

	1885.	1886.	Inc. or Dec.	P. c.
General freight	$7,238,665	$8,639,215	I. $1,400,550	19.4
Coal	4,155,960	5,168,965	I. 1,013,005	24.4
Passengers	3,106,708	3,443,772	I. 337,064	10.8
Mails	177,222	195,010	I. 17,789	10.0
Express	418,438	421,316	I. 2,877	0.7
Miscellaneous	364,186	299,670	D. 64,516	17.7
Car ser., freight	29,277	142,547	I. 113,270	386.9
Total's	$15,490,456	$18,310,495	I. $2,820,039	18.2
Con. transporta'n	4,437,805	4,899,995	I. 462,187	10.4
Motive power	2,959,393	2,954,291	D. 5,102	0.2
Main. of way	1,732,063	2,409,751	I. 677,688	39.1
Main. of cars	1,023,566	1,556,050	I. 532,484	52.0
General expenses	510,749	459,320	D. 51,429	10.1
Totals	$10,663,579	$12,279,407	I. $1,615,827	15.2
Net earnings	4,826,877	6,031,088	I. $1,204,211	24.9
Per cent. of exp.	68.84	67.06	D. 1.78	....

The expenses under conducting transportation (passengers) increased from $1,026,555 in 1885 to $1,154,685, or $128,130, being 12.5 per cent. The principal items being: Advertising, on account of development of local and excursion business; baggage-masters and conductors, on account of increased train service; loss and injury to persons and property, on account of damage to equipment, and settlement of old claims for personal injuries; repairs of stations, general repairs and painting of stations on the entire line, including $80,142 expended on the new stations at Jersey City and Rochester alone; switchmen, by increased train service.

As an indication of the increased train facilities afforded, it is proper to refer to the fact that the passenger train mileage increased 9.19 per cent; yet, with this increase, there has been no change in the actual train expenses; the increase in the department has been caused entirely by work in the nature of repairs and renewals belonging to previous years. The cost per train-mile was 73 cents, being an increase of but 4.28 per cent.; this is remarkable when the large expenditure for repairs of stations are considered, this item alone being $136,470.

The expense under conducting transportation freight increased from $3,411,253 to $3,745,310, an increase of $334,057, or 9.8 per cent.

Among the increases are brakemen and conductors, on account of an increase of 10.45 per cent. in train mileage; car floats, by extensive repairs and rebuilding three floats; clerks, expenses at stations and labor at stations, by an increase of 16.58 per cent. in freight and 30.48 per cent. in coal tonnage; repairs of stations, by rebuilding and extensive repairs generally along the line, $15,579 being expended on account of new freight station at Rochester alone.

While reference is made to the items of increase, it is well to refer to the fact that there was a reduction of $39,694 or 19.45 per cent., in foreign agencies, brought about by the consummation of the plan of consolidating the fast freight lines referred to in the last report. This has resulted in increased efficiency as well as economy, and demonstrates, at least as far as this company is concerned, that the large number of fast train lines formerly in existence were not only unnecessary, but were a positive detriment to the company as well.

The expenses of the motive power department show a decrease from $2,959,393 in 1885 to $2,954,291 in 1886, or 0.17 per cent.

The cost of locomotive service was: 1885, 20.44 cents; 1886, 18.47 cents; decrease, 1.97 cents, or 9.6 per cent. The mileage was:

1885.	1886.	Increase.	Per cent.
12,910,430	14,256,394	1,345,955	10.41

The important items of decrease are: In coal; the decrease is accounted for by a decrease in the cost per ton of from $1.77 in 1885 to $1.42 in 1886, or 35 cents, or 19.77 per cent.; the total tons used increased from 550,712 tons in 1885 to 634,631 tons in 1886, or 15.24 per cent. The policy of using the slack and nut coal wherever possible has been continued with good results, effecting an important saving. Renewals of passenger and freight engines is caused by not having so much work on narrow gauging account as formerly. This work will be completed during the coming year.

The saving in oil was caused by the economies introduced at the company's oil factory where all the prepared oils for the company's use are now manufactured. The saving in wood for locomotives was caused by using, as far as possible, the refuse material from car shops and maintenance of way department for kindling.

The items of increase are: Engineers and firemen, both passenger and freight, caused by an increase in engine mileage, in the former from 3,804,301 miles in 1885 to 4,153,890 in 1886, or 9.19 per cent., in the latter from 6,686,259 miles in 1885 to 7,384,814, or 10.45 per cent. Repairs, both freight of and passenger, are accounted for in the same way. Repairs engine-houses and machine shops were increased by extensive renewals and repairs that had been neglected in former years.

The general condition of the equipment has been improved during the year, 304 locomotives receiving general repairs. What is most needed at the present time is a new class of anthracite passenger engine for the heavy express trains, the present engines being entirely too light, and moreover burning soft coal, which gives great annoyance to the passengers both from smoke and cinders. Two new anthracite engines were purchased during the past year, and have given very satisfactory results. An addition of 10 more at least will be necessary the coming year.

Another want in the equipment is a heavy yard engine. At present no such class of engine exists, and the yard work at important points is done by consolidation locomotives, which are too expensive for the service, and should be released and put on the road, their places being filled by properly designed yard engines. With the additions above referred to, the motive power will be well adapted to the requirements of the traffic, and its efficiency will be of the highest order.

The expenses of maintenance of cars have increased from $1,023,566 to $1,556,050, or $532,484, being 52.01 per cent. This is an increase of 72.91 per cent. over the year 1884, and 58.51 per cent. over the average for the ten years previous.

The principal items of increase are: Increase in repairs of freight cars was caused by continuing the work begun during the previous year of putting in order the large accumulation of cars requiring repairs that had been neglected during years past. The amount of work done can best be illustrated by the fact that there remained at the close of the year 1884, 2,848 freight cars in shop for repairs, or awaiting repairs, while at the close of this year the number was reduced to 467. During the year, including the cars of foreign roads, 437,076 received slight repairs at this company's shops, and in connection with this work, 35,130 cast iron car wheels were used.

The increase in renewals of freight cars was caused by the purchase of 400 box and 400 coal cars, to replace cars condemned and torn down. These cars are of 25 tons capacity, and of the most improved design. The increase in repairs of passenger and baggage cars is caused by the repairs and work required on account of the neglect to maintain this equipment in former years, as can best be illustrated by the fact that out of an equipment of 373 passenger cars, 202 were painted and varnished and 97 received general repairs.

The increase in renewals of passenger cars was caused by rebuilding two coaches. The increase in the item of laborers is explained by the large increase in the work of this department generally.

The passenger equipment has been increased during the year by the addition of 19 first-class coaches, and it has been very much improved by the kind of cars added to replace those condemned and torn down.

The most important requirements of the equipment at the present time are new coal cars, also new stock cars, 34 ft. in length, to replace the old cars, 28 and 30 ft. long, which should be put in the coal and oil trade. In passenger equipment, the express and milk cars require extensive renewals, nearly all of them being old broad-gauge bodies on standard-gauge trucks; this work is already well under way. The express cars are being replaced by new cars especially adapted to the service—part of them being fitted up with refrigerators for the transportation of fruit, poultry, game and dressed meats. The milk cars are being replaced with improved refrigerator cars, fitted for transporting milk long distances. In passenger cars a sufficient number of new modern coaches are required to replace the old broad-gauge coaches, which should be put in the emigrant service. The rapid growth of the suburban traffic makes this improvement in the coach equipment necessary.

The expenses of maintenance of way have increased from

$1,732,063 in 1885, to $2,409,751 in 1886, being $677,688, or 39.1 per cent.

The principal items of increase were: The increase in bridge repairs, caused by the renewal of 20 bridges in iron, representing an aggregate length of 2,059 ft. Those bridges were rebuilt on the most approved designs, and proportioned for the heaviest equipment. The outlay on this account alone was $146,354.

The increase in the item of cross-ties amounts in cost to $369,861, or 109.3 per cent., in number used to 569,509, or 80.7 per cent., the total number put in the track being 1,276,786, an increase of 91.7 per cent. over the average for the past five years.

The quality of the ties used has been very much improved; formerly hemlock and inferior grades of timber were used, now the specifications require hardwood ties in all cases for main tracks.

The increase in steel rails was caused by the purchase of 10,000 tons 74-lb. rails, which were laid in the main line in place the 63-lb. steel rail where the traffic was heaviest and the light rail was fast wearing out; these rails when removed were carefully assorted, and those fit for further use were laid in the branches in place of iron rails, thus not only making a great improvement in the condition of the main track, but also of the branches. The main line is now all laid with steel, and there remains 165 miles of iron rail in the branches, all of which will be removed during the coming year. Switches—this increase was caused by the purchase of safety switches to replace the old-fashioned stub-switch, which was not only expensive to maintain, but a frequent cause of derailment. Track labor—this increase was caused by the large increase in the amount of work done in improving the condition of the track, laying new rail, new frogs and switches.

The work done in this department is the most extensive and important during the year: 183 miles of track have been fully and 54 partially ballasted; in this work 291,517 cubic yards of material was used, 90 miles being ballasted with stone, 116 miles with gravel and 31 miles with furnace slag; 502 improved frogs and 288 safety switches, 33,958 new and improved joints were used. The work of improving the sharp curves on the main line has progressed favorably, and a large number of the sharpest curves have been corrected in their alignment and in the elevation of the outer rail, so as to remove entirely the objectionable motion resulting from high speeds; this work will be pushed forward rapidly and it can be expected in the course of a few years that a passenger passing over the line will at least not notice the curves which have in the past been a source of so much complaint. In addition to this improvement all important junctions, railroad crossings and draw-bridges are being protected with interlocking signals and switches, producing not only increased safety to trains but also economy in operation.

There were 27.94 miles of new sidings built.

The general expenses show a still further reduction from $510,749 in 1885 to $459,320 in 1886, or $51,429, being 10.1 per cent.

TRAFFIC.

The merchandise freight tonnage has increased from 4,116,247 in 1885 to 4,798,760 in 1886, or 16.6 per cent.

The ton mileage from 982,270,163 in 1885 to 1,095,223,024 in 1886, or 11.5 per cent.

Of the total increase of 682,513 tons, 299,795 tons, or 43.93 per cent., was in local business.

The classification shows the increased tonnage to be in lumber, 15.92 per cent.; flour and meal, 19.23 per cent.; grain, 4.02 per cent.; manufactured iron, 2.79 per cent.; iron and other ores, 12.24 per cent.; petroleum, 12.91 per cent.; building stone, 7.19 per cent.

The earnings increased from 0.704 cents per ton per mile, in 1885, to 0.767 in 1886, or 8.9 per cent.

The coal tonnage increased from 6,137,242 in 1885 to 8,008,158 in 1886, or 1,870,916, being 30.5 per cent., 1,216,605 tons, or 65.0 per cent., of the total increase in tonnage being local.

The ton-mileage increased from 705,276,525 in 1885 to 963,170,998 in 1886, or 257,894,473, being 36.6 per cent.

The east-bound movement was 4,777,617 tons, or 59.66 per cent., and the west-bound 3,230,541 tons, or 40.34 per cent. of the total tonnage. Much of this traffic is handled so as to make loads in both directions.

The total is classified as follows:

	Tons.	P. c.
Anthracite	6,579,681	82.16
Bituminous	1,325,466	16.55
Coke	103,011	1.29

The coke traffic is yet in its infancy, but promises in the near future to increase largely, owing to the development of large coke interests in the Reynoldsville and Blossburg regions.

The rate derived from this traffic was 0.537 cent per ton per mile, a decrease of 8.83 per cent. from the previous year, owing to the sharp competition and low prices ruling for coal in the first part of the year; in fact, the rates on bituminous coal to Buffalo and Canada have not yet been restored, and this company has withdrawn largely from that traffic.

The number of passengers has increased from 5,899,757 in 1885 to 6,261,118 in 1886, or 361,361, being 6.1 per cent.

The passenger mileage has increased from 173,944,161 in 1885 to 183,204,462 in 1886, or 9,260,301, being 5.3 per cent.

The earnings per passenger per mile increased from 1.788 cents in 1885 to 1.865 cents in 1886, or 4.3 per cent.

The earnings per passenger train mile were 97 cents, being exactly the same as the previous year. The fact that the passenger mileage has not increased in the same ratio as the passengers carried, indicates the growth of suburban and local traffic—the average train load showing a decrease from 46 to 44 passengers per train, indicates that the traffic has not yet increased in proportion to the train service, but the fact that increased rates make the earnings per train mile the same as last year, fully justifies the policy adopted of providing in every reasonable way for the development of the fine suburban territory on this line.

The total eastward passenger movement was 3,133,037, total westward, 3,128,081. Of the grand total of 6,261,118 passengers carried, 5,753,131, or 91.9 per cent., were local, a sufficient commentary on the efforts generally made to secure through passengers and the useless wars over this traffic.

The emigrant business, which was referred to in the last report, shows an increase of 9,830, or 110.4 per cent., in number, and of $20,156 in revenue, or 56.7 per cent. This traffic is now controlled, as far as the port of New York is concerned, by a clearing house, and each line gets only its alloted percentage, thereby preventing the disastrous competition existing in former years.

The additions to equipment account were 19 passenger cars.

During the year the expenses have been largely increased, as detailed above, in replacing the depreciation of former years; the result has made an increase in the cost per freight-train mile from $1.20 to $1.25, or 4.2 per cent., but this was more than equalized by an increase in the train load from 252 to 279 tons, or 10.7 per cent., resulting in a direct reduction in the cost per ton per mile from 0.475 to 0.448 cent, or 5.7 per cent. This cost is now lower than the average of the trunk lines. As an illustration of what has been done in this direction, it should be noted that the cost this year is 33.53 per cent. less than in 1878 and 15.79 per cent. less than in 1883. The most prominent factors in these results are the consolidation engine and a constant effort to load cars, as far as practicable, in both directions, and haul full trains up to the capacity of the locomotives.

The improvement made in the general condition of the property during the year, and the work in progress, merit a reference here. The new train-shed at Jersey City, the new passenger and freight stations at Rochester, the double track bridge over the Susquehanna River, and the second track over the Starrucca Viaduct, together with the additional track on part of the Carbondale Branch, all will make themselves felt soon in the earnings, as well as the economies of the line. In addition to this, arrangements are now being perfected for equipping that portion of the Eastern Division where the traffic is the heaviest with the most improved block system; this, in connection with stone ballast, safety switches, new coaches and anthracite passenger engines, will soon make the Erie road, with its fine, healthy country, the most popular suburban line out of New York. At least no effort will be spared to attain this result.

Additions to the equipment, both passenger and freight, should be made the coming year, and extensive additions should be made to the yards at Port Jervis and Bergen, to accommodate the increased business. A double track will be required on part of the Carbondale Branch, at least.

A recommendation for increased equipment and yard facilities may seem strange in view of the fact that since the enormous business on this line in 1883 practically three new lines have been opened between Buffalo and New York, but nevertheless the tonnage during the past year is 7.03 per cent. greater than in 1883, and as the line in that year was worked to its full capacity, an increase now in facilities is imperative.

NEW YORK, PENNSYLVANIA & OHIO RAILROAD.

The earnings and expenses of this road were as follows:

	1885.	1886.	Inc. or Dec.	P. c.
Earnings	$5,065,161	$6,161,107	I. $1,095,946	21.6
Conducting transport.	$1,526,667	$1,624,106	I. $97,439	6.4
Motive power	1,198,793	1,351,928	I. 153,134	12.8
Maintenance of way	636,932	714,815	I. 77,883	12.2
Maintenance of cars	282,297	389,334	I. 107,037	37.9
General expenses	39,198	29,049	D. 10,149	25.9
Total	$3,683,937	$4,109,231	I. $425,294	11.5
Net earnings	$1,381,224	$2,051,875	I. $670,651	48.6
Rental	1,621,044	1,971,554	I. 350,509	21.6
Loss or profit	L. $239,820	P. $80,321	I. 320,141	
Per cent. of expenses.	72.73	66.69	D. 6.04	

The locomotive mileage on this road was 7,268,394, an increase of 972,006 miles, or 15.4 per cent. The cost per mile run was 16.88 cents, or decrease of 0.32 cent, or 1.9 per cent.

Renewals included 5,843 tons steel rails and 230,202 ties; 18.13 miles new sidings were built.

The merchandise tonnage has increased from 3,010,274 in 1885 to 3,800,023 in 1886, or 789,749 tons, being 26.2 per cent., 528,910 tons, or 66.9 per cent., of the increase was in local traffic.

The tons carried one mile have increased from 548,812,682 in 1885 to 625,107,372 in 1886, being 76,294,690, or 13.9 per cent.

The increase in tonnage was made up of lumber, flour and meal, pig and bloom iron, manufactured iron, iron ore and refined petroleum. The iron ore traffic has grown to enormous proportions, the total tonnage having increased from 429,588 in 1885 to 784,649 in 1886, being 355,061, or 82.65 per cent., while the receipts at Cleveland alone were 593,073 tons, against 309,662 in 1885, being 283,411, an increase of 91.5 per cent.

The average rate received per ton per mile was 0.555 cent, against 0.479 in 1885, being an increase of 15.87 per cent.

The coal tonnage increased from 1,696,207 in 1885 to 2,061,298 in 1886, or 365,091 tons, being 21.5 per cent.; 269,264 tons, or 73.8 per cent. of the total increase in tonnage being through.

The ton-mileage increased, however, from 145,419,557 in 1885 to 198,809,732 in 1886, being 53,390,175, or 36.7 per cent.

The total is classified as follows:

	Tons.	P. c.
Anthracite	318,590	15.46
Bituminous	1,186,101	57.54
Coke	556,607	27.00

Owing to the large increase in through tonnage, the average rate shows a reduction from 0.620 cent in 1885 to 0.536 in 1886, or 13.5 per cent.

This traffic would have shown a much larger increase had the line been provided with sufficient coal car equipment. The tonnage to Cleveland, including that for the Lake, showing a gain over the previous year of but 37,218 tons, or 7.83 per cent.

The total number of passengers has increased from 1,309,297 in 1885, to 1,465,933 in 1886, an increase of 156,636, or 11.9 per cent.

The number carried one mile, however, has decreased from 76,690,954 in 1885, to 72,933,025 in 1886, being 3,757,929, or 4.9 per cent., indicating a revival in the local passenger business, the average journey showing a decrease from 58¼ miles in 1885 to 49¾ miles in 1886, or 14.96 per cent.

The earnings per passenger-train mile have decreased from $1 in 1885 to $0.97 in 1886, or 3 per cent., caused by the increased train service being slightly in excess of the increased business, the average number of passengers per train being but 45 this year against 53 in 1885, a decrease of 15.09 per cent.

The rate per passenger per mile has increased from 1.688 cents in 1885 to 1.916 cents in 1886, or 13.51 per cent.

It is interesting to note that of the total number of passengers carried, 745,699 traveled eastward and 720,234 westward, and that out of the total of 1,465,933, 1,238,008, or 84.45 per cent., were local passengers.

The operations of this property for the past year have, by the exercise of the greatest economy, resulted in a profit of $80,321 to the Erie Company; but to accomplish this result the expenses per freight-train mile were kept down to the very low figure of last year; the expenses per passenger-train mile were reduced to 52 cents, as against 58 cents in 1885, being a reduction of 10.34 per cent. The expenses per passenger mile were increased from 1.098 cents in 1885 to 1.159 cents in 1886, or 5.56 per cent., on account of the smaller average number of passengers per train. The cost per ton-mile was, however, reduced from 0.409 cents in 1885 to 0.396 in 1886, or 3.4 per cent.

The earnings have been very much restricted during the past four months by a scarcity of cars. In the spring the N. Y., P. & O. Co., at the urgent request of the officers of this company, contracted for 400 new 25-ton cars designed for the ore and coal traffic; these cars, through delays on the part of the contractors, have not all been delivered yet, and the ore and coal traffic has therefore suffered, many vessels loaded with ore being turned away from the docks at Cleveland on account of the scarcity of cars.

There has been, however, a more serious shortage in stock and box cars, particularly the latter, at times the shortage running up to 500 cars per day. The Erie Co. having use for all its cars, and being short on its own line, could not entirely supply this deficiency.

COAL COMPANIES.

The coal companies owned by the New York, Lake Erie & Western Railroad Co., have mined during the year the following tonnage:

	Company supply.	For market.	Total.
Hillside Coal & Iron Co.—anthracite.	145,117	408,919	554,036
Northwest Mining & Exchange Co.—bituminous and coke	236,023	241,352	477,375
Blossburg Coal Co.—bituminous and coke	229,887	176,964	406,851
Towanda Coal Co.—bituminous	146,893	12,955	159,848
Total coal and coke	757,920	840,190	1,598,110

This is an increase over the preceding year of 467,814 tons, or 41.4 per cent.

The only property showing a decrease during the year is the Towanda Coal Co., whose mines are nearly exhausted, and it is expected they will be closed before the end of the coming year.

The Hillside Co. has, however, enlarged its breakers so as to make a capacity at present of 2,850 tons per day, as against a capacity of 2,000 tons per day last year. These improvements have been made at a cost of $38,017.

The Blossburg Coal Co. has increased its capacity for the manufacture of coke by the addition of 50 new and improved ovens, at a cost of $15,000.

A new opening has been made on the property of the Northwestern Mining & Exchange Co., with all the necessary houses, trestles, chutes, etc., increasing the output of the property 1,000 tons per day. This improvement cost $16,320.

These properties all contribute a valuable tonnage to the New York, Lake Erie & Western Railroad, besides saving large sums of money in the cost of supply coal.

The Blossburg Coal Co. shipped 20,338,720 feet of lumber during the year.

UNION STEAMBOAT CO.

The original fleet of this company at the date of its organization consisted of 20 small steamers, with an aggregate carrying capacity of 13,500 tons. The fleet during the present year consisted of 15 steamers with a carrying capacity of 24,000 tons.

This fleet delivered to the New York, Lake Erie & Western Railroad during the year 310,196 tons of freight, and received from them 45,703 tons. The value of this connection has increased so much in importance, owing to the immense development of business on Lake Superior, from the Canadian and Northern Pacific railroads and from the territory tributary to Duluth, that it has been decided to dispose of seven of the older and smaller wooden steamers and replace them with two large steel ships of about 3,000 tons capacity each, which, it is hoped, will be in commission during the coming year.

PAVONIA FERRIES.

The earnings, expenses and net earnings of this property were:

	1885.	1886.	Inc. or Dec.	P. c.
Earnings	$286,588	$292,522	I. $5,934	2.1
Expenses	230,248	308,144	I. 77,896	33.8
Profit or loss.	P. $56,340	L. $15,622	D. $71,962	

The increased expenses are caused to a small extent by running an extra boat on the Twenty-third street ferry, but principally by the very heavy repairs necessary to the whole fleet, six boats receiving repairs, amounting in the aggregate to $81,135, or an average of $13,522 per boat. A new and powerful boat was added to the fleet at a cost of $90,816.

CONCLUSION.

The past year opened with fair prospects for peace and a maintenance of rates among the trunk lines. This result had been so far realized, and the earnings of the company increased to such an extent, that important repairs and renewals were undertaken, both on the road and equipment—work that, owing to financial embarrassment and commercial depression, was postponed from time to time. This work, all necessary but not fairly chargeable to the operations of the year, cost in the aggregate $1,023,056. This leaves the property in excellent condition, much better than it has ever been.

STATISTICS.

The average train-load on the Erie last year was 44 passengers, or 279 tons of freight; on the New York, Pennsylvania & Ohio, 45 passengers or 188 tons of freight.

The earnings per ton-mile on the Erie lines for 20 years have been, in cents:

1867	2.038	1872	1.526	1877	0.955	1882	0.749
1868	1.810	1873	1.454	1878	0.973	1883	0.786
1869	1.538	1874	1.311	1879	0.780	1884	0.719
1870	1.333	1875	1.209	1880	0.836	1885	0.656
1871	1.433	1876	1.098	1881	0.805	1886	0.659

The rate last year was lower than that of any preceding year except 1885.

The income account may be summed up as follows:

Net earnings of road		$6,111,410
Interest on securities		424,829
Profits on elevators, etc		83,359
Total		$6,619,597
Losses on Pavonia Ferry, etc	$60,026	
Interest on funded debt	4,833,893	
Rentals of leased lines	1,239,401	
Interest on equipment	274,991	
Miscellaneous charges	196,675	
		$6,604,986
Balance, surplus for the year		$14,611

It is to be noted that the interest charged includes some interest which accrued, but was not paid, being funded by arrangement as noted.

The general account, in a condensed form, with changes from 1885, is as follows:

Liabilities:

	1886.	Inc. or Dec.
Capital stock	$85,451,100	I. $82,200
Funded debt	78,500,385	I. 3,231,900
Deferred liabilities	214,188	D. 3,849,837
Current liabilities	5,022,285	D. 1,425,317
Assessments and income balances	6,968,649	D. 11,866
Total	$176,156,607	D. $1,972,920

Assets:

Road and equipment	$162,910,160	D. $2,730,399
Investments	3,423,035	I. 95,900
Advances to leased and controlled lines	2,573,405	D. 228,763
Current assets, cash, etc	4,197,096	I. 958,671
Contingent assets, claims, advances, etc	3,052,911	D. 68,329
Total	$176,156,607	D. $1,972,920

The changes in the funded and other debt, with the reasons for them and the manner of making them, were set forth fully in President King's report, as published last week.